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CURTIS'S BOTANICAL MAGAZINE.

CONTAINING HAND-COLOURED FIGURES, WITH DESCRIPTIONS AND OBSERVATIONS ON THE
BOTANY, HISTORY AND CULTURE, OF NEW AND RARE

PLANTS FROM THE ROYAL BOTANIC GARDENS, KEW,
AND OTHER BOTANICAL ESTABLISHMENTS AND PRIVATE GARDENS.

EDITED BY

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Late Keeper of Herbarium and Library, Royal Botanic Gardens, Kew.

VOL. CXLVIII. (1922).



“With tender heed,
Bringing thee chosen plants and blossoms blown
Among the distant mountains.”—*Wordsworth*.

PUBLISHED FOR

THE ROYAL HORTICULTURAL SOCIETY, LONDON,

BY

H. F. & G. WITHERBY,
326, HIGH HOLBORN, LONDON, W.C.1.

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LONDON:
PRINTED AND PUBLISHED BY
MESSRS. H. F. AND G. WITHERBY
326, HIGH HOLBORN, W.C.1.

- Part I. (tt. 8934-8945) published October 30th, 1922.
„ II. (tt. 8946-8956) „ February 20th, 1923.
„ III. (tt. 8957-8967) „ May 3rd, 1923.
„ IV. (tt. 8968-8977) „ August 13th, 1923.

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To
GEORGE FORREST

WE DEDICATE THIS VOLUME AS A TOKEN OF OUR
ADMIRATION OF THE ENERGY, COURAGE AND
SAGACITY WITH WHICH HE HAS IN REPEATED
EXPEDITIONS SINCE 1904 EXPLORED THE FLORA
OF THE BORDERLANDS OF YUNNAN AND TIBET,
AND AT THE SAME TIME AS A SPECIAL TRIBUTE
OF OUR GRATITUDE FOR THE INTRODUCTION OF
THE MANY NEW AND BEAUTIFUL PLANTS WHICH
HORTICULTURE OWES TO HIM AND OF WHICH NOT
A FEW ADORN THE PAGES OF THIS VOLUME.

THE COMMITTEE.

Westminster, June, 1923.

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TAB. 8934.

JASMINUM REX.

Siam.

OLEACEAE. Tribe JASMINOIDEAE.

JASMINUM, *Benth. & Hook. f., Gen. Plant. II., 674; Knoblauch in Engl. & Prantl, Nat. Pflanzenf. IV., 2. 15.*

Jasminum rex, *Dunn in Kew Bull. 1921, 219*; simile *J. nobili*, C. B. Clarke, sed foliis maioribus late oblongis breviter acuminatis distinctum.

Frutex scandens, glaberrimus, ramulis teretibus. *Folia* simplicia, breviter petiolata; lamina late oblonga, breviter acuminata, basi subacuta vel rotundata, 10–20 cm. longa, 4–5 cm. lata, tenuiter coriacea, e basi vel paulo supra 3-plinervis, abhinc utrinque tenuiter 6–8-nervis. *Flores* in cymas 3–2-floras terminales et subterminales collecti; pedicelli ad 2.5 cm. longi. *Calycis* segmenta subulata, 0.8 cm. longa. *Corolla* candida, inodora, tubo demum 2.5–3 cm. longo, lobis obovato-oblongis obtusis 2.5–3.5 cm. longis ad 1.3 cm. latis. *Bacca* ovoidea, 1.4 cm. longa, 0.8 cm. diametro, monosperma.

A perfectly glabrous *shrub*; the young branches round, green and smooth. *Leaves* opposite, spreading with slightly drooping tips, simple, with short stalks which are jointed below the middle; blades broad-oblong from a shortly pointed or blunt base, contracted upwards into a short sharply pointed gland-tipped acumen, 10–20 cm. by 4–5 cm., thinly leathery, dark green on the face, paler below, midrib slender, sharply raised on the back, nerves unequal, the lowest pair faint and very close to the margin, the next well marked, raised on both sides and arching upwards to the acumen, 4–8 mm. within the margin below, then approaching it more closely, the following nerves rather faint, raised on both sides, rising at an angle of about 50°, loosely branched so as to form a wide-meshed net of veins. *Flowers* in drooping cymes of 2 or 3, gathered into short leafy panicles at the end of the branchlets, scentless; peduncles 1.5–2 cm. long with a pair of small awl-shaped bracts, not much over 1 mm. long; pedicels jointed to the peduncle, 2–2.8 cm. long, thickened upwards, the lateral supported by bracts like those of the peduncle, if not longer. *Calyx*: tube 3 mm. long, 2.5 mm. wide; lobes 6, linear, very narrow, almost awl-shaped, pointed, 5–8 mm. long. *Corolla* pure white; tube 2.5–3 cm.

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RHODODENDRON WILLIAMSIANUM.

West China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, *Linn.*; *Benth.* & *Hook. f.*, *Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron Williamsianum, *Rehder & Wilson in Sargent, Pl. Wilson.* I. 538 (1913); arcte affine *R. callimorpho*, *Balf. f. & W. W. Smith*, sed foliorum laminis raro 3.5 cm. excedentibus, floribus plerumque 2-3, corolla emaculata distincta, praeterea multo parcius glanduloso-pilosum glandulis haud rubris.

Frutex humilis, ramulis parce glanduloso-pilosis, ramis vetustis cortice griseo obtectis. *Gemmae* ovoideae, purpureo-brunneae, squamis interioribus oblanceolatis tenuibus glanduloso-ciliatis. *Foliorum* laminae late ellipticae vel subcircularares, subcordatae, obtusissimae, mucronulatae, vix ultra 3.5 cm. longae, ad 3 cm. latae, coriaceae, supra atro-virides, infra pallidae vel glaucae, basin versus glanduloso-ciliatae, caeterum subglabrae, costa nervisque tenuibus; petioli 7-12 mm. longi, purpurascens, glanduloso-pilosi. *Flores* 2-3, raro plures, subumbellati; bracteae obovato-oblongae, dorso sericeae; bracteolae subfiliformes, pubescentes; pedicelli 2 cm. longi, parce glanduloso-pilosi vel subglabri. *Calyx* subpatelliformis, 5-lobus lobis saepe obsoletis, glanduloso-pilosus. *Corolla* campanulata, 5-loba, ad 4 cm. longa, per limbum ad 5 cm. latum, pulcherrime rosea, emaculata, glabra, lobis rotundatis late emarginatis. *Stamina* 10; filamenta glabra, 3 cm. longa. *Ovarium* oblongum, viride, laxe glanduloso-pilosum, 6-loculare; stylus basi glandulis stipitatis, supra glandulis sessilibus obsitus, 3-3.5 cm. longus; stigma capitatum. *Capsula* oblonga, recta 1.8 cm. longa, grisea. *Semina* oblique ovata, cum alis fere 2mm. longa, alis apice ad 0.6 mm. productis ad latera angustis basi valde obliquis.—*Balf. f. in Not. R. Bot. Gard. Edinburgh* X. 96 (1917); *Millais, Rhodod.* 94, 262 (1917).

A small *shrub*, intricately branched, in its home up to 1.5 m. high; branches slender, greenish when young with scattered stalked glands about 1 mm. long, soon glabrescent, after the first year with a shining brownish and ultimately grey bark which cracks longitudinally and transversally. *Leaf-buds* ovoid, pointed, purplish brown, outer scales elliptic, inner oblanceolate, thin, up to 1 cm. long, fringed with glands, the lower distant and stalked, the upper close and sessile. *Leaves* stalked; blade broadly elliptic or round from a shallowly cordate or truncate base, very blunt with a small hard point, recurved along the margin, up to over 3.5 cm. long, and 3 cm. broad, often much smaller, leathery, dark green on the face, pale and more or less glaucous on the back, very sparsely hairy on the face when unfolding (the hairs

white, simple, bifid or wisp-shaped, soon collapsing and mostly disappearing), more or less fringed, at least near the base, with stalked glands and bearing a few minute sessile or subsessile glands on the back; midrib and lateral nerves slender, slightly impressed on the face and raised on the back when dry, veins delicately and very prettily netted on the back; leaf-stalk 0.7–1.3 cm. long, purplish or at length green, with long-stalked glands. *Flowers* 2 or 3, rarely more, in umbel-shaped racemes; bracts obovate-oblong, blunt, pale silky on the face; bracteoles at the base of the pedicels almost filiform, pubescent, over 1 cm. long; pedicels about 2 cm. long with, or rarely without, stalked glands. *Calyx* almost patelliform, shortly 5-lobed or reduced to a wavy rim, beset with stalked glands. *Corolla* bell-shaped, uniformly rose-coloured, 5-lobed, up to over 4 cm. long, 2.5 cm. wide at the middle and 5 cm. across the limb, quite glabrous; lobes rounded, shallowly emarginate, up to 2 cm. in diameter. *Stamens* 10; filaments slightly widened at the base, glabrous, the longest 3 cm. long; anthers 3–3.5 mm. long, orange-brown. *Disc* annular, green. *Ovary* oblong, green, about 6-celled, loosely covered with stalked glands, the latter extending some distance up the style which higher up is glabrous and smooth but for some very small sessile glands below the small capitate stigma, and up to 3.5 cm. long. *Capsule* oblong, straight, 1.8 cm. long, greyish brown, supported by the thickened calyx-rim. *Seeds* obliquely ovate in outline, almost 2 mm. long including the wing which is very oblique at the base, narrow along the sides and produced to about 0.6 mm. at the top, pale brown.

DISTRIBUTION.—Western China, Szechuan, rare in thickets on the cliffs of Wa Shan (103° 14' E., 29° 21' N.) at 2,800 m., *Wilson* 1350.

This species, one of the loveliest of the genus, was discovered by Mr. E. H. Wilson on Wa Shan in 1908. Wa Shan is a mountain situated to the south-west of the better known sacred Mount Omei, and like this remarkable for its wonderfully varied flora. It rises to over 3,400 m. At 2,300 m. rhododendrons begin to

appear, but they are most abundant at 3,100 m. and upwards, where they are the dominating element of the vegetation. The affinity with *R. callimorphum* is quite obvious. It has also been compared with *R. Souliei*, which, however, is easily distinguished by its relatively large calyx. Sir I. B. Balfour has included these species along with several more from West Szechuan and West Yunnan in a series which he links on to the Himalayan *R. campylocarpum*, but he admits himself that the homogeneity of the series is somewhat doubtful.

Seeds of *R. Williamsianum* were first received in England in 1909. The specimen from which the drawing was prepared was kindly communicated by Mr. J. C. Williams, of Caerhays Castle, Cornwall, after whom the plant has been named. Mr. Williams writes that it does very well with him and produces seed most years; but so far even well-grown plants have not attained to more than 30 cm. in height. In his experience it likes very well drained, cool and moist soil. Where it starts very early it is liable to be injured by frost, otherwise even prolonged dry cold should not damage it. At Kew it has proved so far somewhat delicate, no doubt for the reason given by Mr. Williams. In Sussex, on the other hand, it is quite hardy, according to Mr. Millais. As it strikes freely from cuttings and seed frequently becomes available it deserves every attention. Its fine foliage and exceedingly beautiful flowers, combined with a dwarf habit, ought to make it a great ornament on rockwork wherever it can be tided over the early season without sprouting too freely. It has flowered under glass at Kew as early as March, but its normal flowering time in the open is in June, only a little earlier as it seems than in its native country.

O.S.

Fig. 1, a flowering branch, nat. size; 2, young leaf, $\times 2$; 3, mature leaf, back view, nat. size; 4, glands from the back of a young leaf, $\times 50$; 5, bracteole from the base of a pedicel, $\times 4$; 6, calyx and pistil, $\times 4$; 7, stamen $4\times$; 8, section of ovary, $\times 6$; 9, capsule, $\times 2$; 10, seed, $\times 12$. Figs. 9 and 10 from Wilson 1350, the rest from Mr. Williams's specimen.

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PODANTHUM FLORIBUNDUM.

Asia Minor.

CAMPANULACEAE. Tribe CAMPANULEAE.

PODANTHUM, Boiss., *Fl. Or.* III. 945 (1875); *Richard Schulz, Mon. Gatt. Phyteuma* 19 (1904); *Phyteuma Sect. Podanthum, G. Don.*; *Benth. & Hook. f., Gen. Plant.* II. 561 (1873); *Schönland in Engl. & Prantl, Nat. Pflanzenf.* IV. 5. 54.

Podanthum floribundum, *Stapf* (sp. nov.); affine *P. lobelioidi*, Boiss., sed paniculis angustis floribundis breviter vel brevissime ramosis, floribus maioribus sursum approximatis distinctum.

Herba perennis, 5 dm. alta, collo pluricipite. *Caules* e tertia parte inferiore foliati et longe fastigiatim ramosi; rami inferiores ad medium, caeteri saltem basi foliati, uti axis primaria in paniculam longam angustam floribundam abeuntes, graciles; omnes axes minute canescenti-pubescentes, robustiores tenuiter albo-costatis. *Folia* infima mox evanida, breviter petiolata, caetera sessilia, e basi attenuata anguste lanceolata, magis minusve acuta, repando-dentata, ad 12 cm. longa, 1 cm. lata, superiora cito decrescentia, viridia, utrinquelaxe pubescentia, ad marginem ciliolata. *Paniculae* erectae, 15-25 cm. longae, infra 3-9 cm. latae, superne angustesubspicatae; rami obliqui vel suberecti, infimi paniculae terminalis ad 9 cm., particularum lateralium ad 4 cm. longi, basi nudi vel subnudi, deinde flores plerumque solitarios laxae vel apice dense dispositos gerentes, rami superiores valde abbreviati floribus congestis, summi ob florum lateralium abortum ad florem solitarium reducti; omnes foliis brevibus vel bracteis lanceolatis suffulti; pedicelli 2-1 mm. longi vel subnulli. *Receptaculum* angustum, sensim in pedicellum attenuatum, tenuiter 5-costatum costis acutis albis, inter eas minute albo-papillosum, 3 mm. longum. *Sepala* subulata, 3 mm. longa, albo-marginata. *Corolla* fere ad basin 5-fida, amoene purpureo-violacea, segmentis patulis lineari-lanceolatis leviter recurvis, ad 12 mm. longis. *Antherae* 3 mm. longae, polline rubro-purpureo. *Stigma* breviter 3-lobum. *Capsula* matura ignota.

A perennial herb, about 5 dm. high, throwing up shortly ascending or erect stems from a short, almost woody base, which is covered with the dry imbricate remains of old leaf-bases. *Stem* with long leaf-supported branches from the lower third, rising at angles of 40-30°, then erect, parallel, and of almost equal length; lower branches leafy to the middle, the following bearing leaves at least towards the base, all like the primary axis passing into a long many-flowered panicle; all axes greyish-pubescent and very finely ribbed, the hairs very short and rather stiff, whitish and mostly slightly recurved, the ribs white or often silvery, the epidermis below the insertion of the leaves more or less lifted from the underlying tissues, forming decurrent hyaline ridges.

Leaves mostly sessile, only the lowest with short slender stalks widened at their insertion into short imperfect sheaths, which persist and cover the stem base very closely; blades narrowly lanceolate, more or less acute, with very shallowly scalloped margins and distant teeth, those supporting the main-branches up to 12 cm. by 1 cm., the upper decreasing rapidly in length, all green, loosely and shortly hairy on both sides and minutely ciliate on the margins; midrib slender or widened towards the base, lateral nerves faint, very oblique. *Panicles* 15-25 cm. long, 3-9 cm. wide at the base, upwards very narrow and almost spikelike; branches oblique or nearly erect, the lowest of the terminal panicle to 9 cm., of the lateral to 4 cm. long, bare or almost bare at the base, then bearing mostly solitary flowers, which are distant below and more crowded upwards, the upper branches much shorter, with often crowded flowers, and followed upwards by solitary flowers; most of the solitary flowers of the panicle with rudiments of arrested flowers at the base (reduced cymes); all branches supported by short, narrow lanceolate-linear or linear leaves, which pass upwards into lanceolate to awl-shaped bracts 6-4 mm. long or below the solitary flowers still shorter, but always longer than the pedicels which rarely attain to a length of 2 mm. *Receptacle* narrow, gradually passing into the pedicel, 3 mm. long, 5-ribbed; ribs fine but well marked, acute, white; intercostal faces densely covered with minute white papillae. *Sepals* awl-shaped, 3 mm. long, with fine white margins. *Corolla* 5-cleft, almost to the base, rotate, of a rich purple-violet; segments slightly recurved, linear-lanceolate, 10-12 mm. long. *Filaments* with a round, minutely ciliate base; anthers 3 mm. long, dehiscing in the bud; pollen red-purple. *Style* hardly 4 mm. long, stigma minutely 3-lobed. *Ovary* cells 3. *Capsule* unknown.

DISTRIBUTION.—Asia Minor (see below).

This handsome herb has been growing in the Botanic Garden at Edinburgh for some years. Professor W. W. Smith, who kindly supplied the material for the present plate, writes that the plant was raised from seed

received from W. Siehe, in Mersina, but neither the number nor the name under which it was distributed can be traced now, and the only specimen of Siehe's comparable with it in the Kew Herbarium is evidently not the species here described. The ranges of the Anatolian Taurus have supplied Boissier with material for the description of about a dozen species of *Podanthum*, half of which, however, were subsequently reduced by the author to varieties or relegated to synonymy. Among the latter there are three: *P. stylidioides*, *P. Pestalozzae*, and *P. gracile*, which in his Flora Orientalis are included in *P. lobelioides*, the species with which I have contrasted our plant. *P. lobelioides* was described by Willdenow in 1794, from a specimen collected by Gundelsheimer, Tournefort's companion on his journey to the Levant. It was figured by the author in his Phytographia (tab. iv, f. 2); and to judge by the figure is clearly not *P. floribundum*, but a species apparently confined to Armenia and the adjoining parts of eastern and northern Anatolia. The three names quoted as synonyms may represent one or several species distinct from *P. lobelioides* and also from *P. floribundum*. Like the genus generally, they require reinvestigation very badly.

Podanthum is one of those groups which present themselves immediately to the observer as homogeneous natural phyla, whilst, on the other hand, their technical floral characters connect them closely with other similarly constituted groups. Thus *Podanthum* was early (1835) recognized as a natural group and has ever since been treated as such. Its taxonomic status, however, was, and is, still a matter of controversy. The flowers being practically those of a *Campanula* with the corolla split to the base, a condition characteristic of *Phyteuma*, *Podanthum* was originally proposed by its author, G. Don, as a section of *Phyteuma*, and it is still treated so in the great taxonomic compendia; but habit and distribution, as well as the steady increase in the number of species which are found to follow the type presented by it, justify on theoretical and practical grounds its treatment as a distinct genus. Boissier, all the recent writers on the oriental floras, and Richard Schulz, the monographer of *Phyteuma*, are agreed on that point. Boissier

enumerates (Fl. Or. III. 945-957) 26 species and 7 varieties, to which another 10 or 12 species have to be added from the more recent literature. From a precursory scrutiny of the material in the Kew Herbarium the number distinguishable at present may be put at over 40. They are most numerous in Asia Minor and Armenia, whence the genus radiates to the east and the north-east (Caucasus, Persia and Turkestan) and to the west (the Balkan Peninsula and the Carpathian region, South Italy and Algeria), covering an area which is of the most natural description, and excludes that of *Phyteuma* in the restricted sense.

Podanthum floribundum is a hardy herb of decorative value, thanks to the abundance of brightly coloured flowers which it produces over a succession of weeks. In Edinburgh it flowers all through June. If it should ripen seeds—it has not done so far—it could be propagated most easily from them; otherwise cuttings will have to be tried. Once established it ought to do well in dry and sunny situations. O.S.

Fig. 1, whole plant (somewhat diagrammatic), $\times 1/3$; 2, a panicle (lower two-thirds), nat. size; 3, part of stem, $\times 3$; 4, lower leaf, nat. size; 5, flower-bud, $\times 2$; 6, flower, with parts of calyx and corolla cut off, $\times 3.5$; 7, stamens and stigma from a bud, $\times 5$; 8, a single stamen taken from a bud, $\times 5$; 9, stigma still closed and covered with pollen, $\times 5$; 10, stigma opened out, $\times 5$.

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TAB. 8937.

MESEMBRIANTHEMUM FRAGRANS.

South Africa.

FICOIDEAE. Tribe MESEMBRIANTHEMEAE.

MESEMBRIANTHEMUM, Linn.; *Benth. & Hook. f., Gen. Plant. I. 853; Pax in Engl. & Prantl., Nat. Pflanzenf. III. 1. B. 45; Berger, Mesembr. u. Portul. 2.*

Mesembrianthemum fragrans, *Salm Dyck, Obs. Bot. 8 (1820) et Mesembr. §.8, fig. 2 (1823)*; arcte affine *M. grandifloro*, Haw., sed foliis cuiusque paris magis inaequalibus basi intus haud gibbosis, petalis in cupulam late apertam dispositis neque horizontaliter patentibus, sepalis inaequalibus distinctum.

Herba succulenta, perennis, acaulis, caespitosa. *Folia* paribus 4-5 2-seriata, inaequalia, percrassa, lineari-oblonga, dorso alte convexa, obtusa vel oblique subacuta, ad 8, rarius ad 10 cm. longa, ad 2.5 cm. lata, laete viridia vel pro tempore glaucescentia. *Flores* solitarii, sessiles, 6-8 cm. diametro, aureo-flavi, suaveolentes. *Calyx* alte 4-fidus, segmentis exterioribus oblongis acutis anguste hyalino-marginatis, interioribus late rotundatis marginibus latissimis hyalinis. *Petala* linearia, basi attenuata, e fundo ascendentia, acuta vel obtusa et apice crenulata, 4 cm. longa, 3 mm. lata. *Stamina* erecta; filamenta ad 10 mm. longa. *Receptaculum* turbinatum, vix 1 cm. altum. *Ovarii* vertex hemisphaericus, 8-lobus. *Stigma* sessile, 8-radiatum, radiis crassiusculis fimbriatis. *Capsula* subglobosa, 8-valvata, 7-9 mm. diametro. *Semina* papillis pistilliformibus pulchre ornata. Haw., Rev. Pl. Succ. 95 (1821); Link et Otto, Icon. Pl. Select. 93, t. 43 (1823); Hoffmannsegg, Verz. Pflanzenkult. 220 (1824); DC. Prodr. III. 421 (1828); Sonder in Harvey & Sonder, Fl. Cap. II. 402 (1862); *M. linguiforme* var. *fragrans*, Berger, Mesembr. u. Portul. 242 (1908).

A succulent herb, perennial, stemless with prostrate branches, perfectly glabrous. Leaves opposite, rising in close succession in superposed pairs, 2 or 3 pairs produced each year, those of the preceding year still present and fresh at the time of flowering, the leaves of each pair unequal in size and to some extent also in shape, tightly appressed to each other in bud, the smaller on unfolding, leaving on the face of the larger a marked flat impression which expands as the leaves grow, and in connection with a slight original obliquity of the leaves and a tendency to curve or twist, often leads to asymmetry, all the leaves linear-oblong in outline, triangular to semi-elliptic in cross-section with acute or blunt angles, blunt at the tips or slightly pointed, with the back often produced into a hump, the longer leaves up to 8, rarely 10 cm., long and up to 2, rarely 4, cm. broad, sap-green or temporarily almost glaucous. Flowers solitary from

the leaf-axils, usually only one open at a time, sessile, 7-8 cm. in diameter, of a pure bright yellow, bowl- or cup-shaped, sweet-scented. *Calyx-segments* 4, unequal, the outer pair oblong, with a usually sharp red point and fine hyaline margins joining below the tip, 1.2-1.5 cm. long, the inner pair rounded with a very broad hyaline margin, including it up to 1.5 cm. across. *Petals* linear, narrowed towards the base, ascending from the bottom of the flower, then gently recurved, up to 4 cm. long and 3 mm. wide, shortly pointed or blunt and then minutely crenulate. *Stamens* erect around the stigmas, filaments up to 10 mm. long; anthers yellow, 1.5 mm. long. *Receptacle* obconical, short; top of the ovary hemispherical, 8-lobed. *Stigma* sessile, 8-rayed, rays stout, up to 6 mm. long, coarsely feathery. *Fruit* an almost globose, 8-valved capsule, 7-9 mm. in diameter, 8-celled, when wetted expanding into an 8-rayed star over 2.5 cm. across, with an oblong callus in each sinus which is flanked by a pair of black stays or ribs ascending to the bases of the adjoining valves. *Seeds* broad-elliptic in side view, 1 mm. long, shortly stalked; seed coat densely covered with stout peg-shaped papillæ.

DISTRIBUTION.—Cape of Good Hope; Ladismith Division, Ladismith Commonage, *I. B. Pole-Evans*.

Prince Salm Dyck obtained the specimen which he described and figured as *Mesembrianthemum fragrans* from the Botanic Garden at Karlsruhe in 1816. Whence, however, it came originally is unknown beyond the general statement that it was raised from South African seed. It may have been one of the numerous succulents introduced into England by Masson between 1774 and 1795, or have reached Karlsruhe through Vienna, where there was a considerable collection of South African plants in those days. It was rediscovered by Dr. I. B. Pole-Evans in the Karroo east of the town of Ladismith, where, he informs me, it was by no means uncommon. The present plate was prepared from a specimen communicated by him to Kew in 1919.

Herr Berger has recently reduced *M. fragrans* to a variety of *M. linguiforme*, Haw., a species already known to Dillenius. In my opinion, however, it is sufficiently

distinct to merit the status of a species. Mr. N. E. Brown on the other hand is inclined to refer it to *M. depressum*, Haw., which was figured in the Botanical Magazine t. 1866, but this plant differs markedly in the shape of the leaves, the size of the flowers, and if the plants grown at present as *M. depressum* at Kew actually represent that species, also in the structure of the seed coat. This author has also revived the genus *Glottiphyllum* proposed by Haworth for the group of the *Linguiformia* of which *M. fragrans* is a member. With all deference to his critical knowledge of the species of this difficult genus, I think the time has not come for breaking it up into smaller generic units, although it will certainly have to be done in the future. At present we know too little of the more intimate structure of the flower, and particularly of the fruit and seed and its correlation with the vegetative characters. Herbarium specimens, unless prepared on the spot with great care, are of little use for that purpose, but the relative ease with which these plants can be grown, even in a limited space and with modest means, ought to be a great inducement to continue their study on the lines which have proved so fruitful in Mr. Brown's hands.

Breynius's original spelling of the name of the genus, namely *Mesembrianthemum** with *i* is so appropriate as compared with Dillenius's far-fetched version *Mesembryanthemum* with *y* and its laboured interpretation** that I have followed recent writers in restoring it. The bulk of the mesembrianthemums are veritable noon-day flowerers who revel in sunshine, without which they hesitate to unfold the full beauty of their flowers.

Mr. Brown has referred to the seasonal change of colour shown by the leaves of many species. It may therefore be of interest to record my own observations with regard to *M. fragrans*. When examining the plants in the pit at Kew last March, I was struck by the glaucescence of their leaves, which was so entirely at variance with a coloured drawing made by Miss Snelling the year

* From *μεσημβρια*, noon-day, and *ἀνθεμον*, flower.

** "Flos nempe cui embryo est in medio" and "... tenaciter medio embryoni . . . circumnascatur."

before at the end of August, that I suspected an error in labelling, the more so as an earlier picture by Miss Smith done at Kew on the 1st September also showed them more or less glaucous. A few weeks later, however, the same plants assumed the rich sap-green colouring shown in the plate and they have remained so until now (July).

At Kew *M. fragrans* is grown in the succulent pit along with numerous other South African plants. It succeeds well and is easily propagated by division. It has flowered so far about the end of August or the beginning of September, at Kew as well as at Colesborne, but this year flowering set in at Kew early in July. The flowers open in the morning and begin to close soon after midday, each flower lasting about a week. They are sweet-scented, the scent which is rather faint, recalling that of lilies of the valley.

O.S.

Fig. 1, half a plant, nat. size; 2, a closed flower in side view, nat. size; 3, section through a flower, $\times 2$; 4, fruit in the dry state, $\times 2$; 5, a fruit, wetted with the valves spread out, $\times 2$; 6, part of a fruit cut open and flattened out (wet), $\times 5$; 7, seed, $\times 20$.

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AESCHYNANTHUS SIKKIMENSIS.

India.

GESNERACEAE. Tribe AESCHYNANTHEAE.

AESCHYNANTHUS, Jack; *Benth. & Hook. f., Gen. Pl.* II. 1013; *C. B. Clarke in DC., Monogr. Phan.* V. 18. *Trichosporium*, *D. Don*; *Fritsch in Engl. & Prantl, Nat. Pflanzenf.* IV. 3 b. 152.

Aeschynanthus sikkimensis, *Stapf* (sp. nov.); *a. A. maculato** (syn. *A. maculato* var. *stenophyllo*, *C. B. Clarke*) habitu robustiore, foliis latoribus plerumque integris, pedicellis calycibusque glaberrimis distinctus.

Suffrutex praeter corollas et filamenta et stylum glaberrimus, ramis pendulis. *Foliorum* lamina e basi sensim attenuata oblongo-lanceolata, acuminata, 6-15 cm. longa, 2-4 cm. lata, integra vel obsolete denticulata. *Cymae* floribus 6 vel paucioribus; bracteae subulato-lineares, ad 4 mm. longae; pedicelli graciles, 1 cm. longi. *Calycis* tubus cylindricus vel sursum ampliat, 3-4 mm. longus; lobi tubo aequilongi vel breviores, lineares. *Corolla* e basi angusta curvata, sursum ampliata, 2.5-3 cm. longa, lobis subaequalibus 2 mm. longis, rubro-coccinea, limbo nigro-maculato, extra glanduloso-pilosula. *Samina* e corolla breviter exserta; filamenta glanduloso-pilosula. *Stylus* superne glanduloso-pilosulus. *Capsula* anguste fusiformis, circiter 15 cm. longa. *Semina* oblonga, vix 1 mm. longa, scrobiculata, basi pilis 2, apice pilo 1 munitis, pilis longissimis.—*A. maculatus* var. *sikkimensis*, *C. B. Clarke in DC. Monogr. Phan.* V. 1. 24 (1883).

An epiphytic *undershrub* with pendulous branches, perfectly glabrous with the exception of the corollas, the filaments and the style. *Leaves* stalked; blade oblong-lanceolate from a gradually narrowed base, acuminate or caudate, 6-15 cm. long, 2-4 cm. broad, entire or very indistinctly toothed, fleshy-leathery, pale green, the midrib rather stout, the lateral nerves very oblique, indistinct, about 5 on each side. *Cymes* axillary and terminal, much contracted, of up to 6, rarely more, flowers; bracts linear to awl-shaped, up to 4 mm. long; pedicels slender, at length over 1 cm. long. *Calyx* 5-toothed; tube narrowly cylindric or upwards wider, 3-4 mm. long; teeth as long as the tube or slightly shorter, very narrow, linear-lanceolate or almost awl-shaped. *Corolla* curved, funnel-shaped, narrow at the base, about 2.5-3 cm. long, 6-7 mm. wide at the mouth,

* *Aeschynanthus* is made here masculine as was done originally by Sprengel and G. Don and in accordance with the general rule observed in names ending in -anthus.

with short almost equal rounded lobes which are about 2 mm. long, scarlet with short glandular hairs outside, more yellow and glabrous inside, the lobes marked with black decurrent streaks. *Stamens* shortly exerted from the corolla (the longer sometimes by 1 cm.); filaments with short glandular hairs; anthers purplish. *Ovary* linear, immersed at the base in a cup-shaped disk, glabrous; style in the early (male) stage of flowering much shorter than the corolla, ultimately exerted from it by 1 cm. or more, the upper part with short glandular hairs. *Capsule* linear, narrowed at both ends and stalked at the base, curved, up to 15 cm. long. *Seed* oblong, almost 1 mm. long; testa wrinkled, with 2 hairs at the base and 1 at the other end; hairs 2–2.5 cm. and 3–4 cm. long respectively.

DISTRIBUTION.—India, hot outer valleys of the Himalaya: Sikkim, from 900–1,800 m., *Hooker* (*Aeschynanthus* no. 15, *type specimen*); Bootan, *Griffith*, Kew Distr. 3318. Khasia Hills, *Hooker and Thomson* (*Aeschynanthus* no. 15).

Aeschynanthus sikkimensis belongs to a small group of species which is technically distinguished by the presence of a pair of long hairs at the lower end and a similar single hair at the upper end of the seed, the hairs being elongations of the seed-coat; hence the name of the section *Diplotrichium*. They are epiphytic shrubs of a very uniform habit and similar floral structure, and there has been a considerable divergence of opinion as to the taxonomic status of the forms which have been recognised within the group. Thus Clarke in his monograph of the Cyrtandreae recognises *A. sikkimensis* as a variety of *A. maculatus*, whilst in Hooker's Flora of British India he merges it in *A. maculatus* proper and in an earlier paper on the Commelynaceae and Cyrtandreae of Bengal he refers *A. maculatus* itself to *A. ramosissimus*. However, the accession of new material, our more intimate knowledge of the plants and the consequent need for greater precision suggest further segregation and the accordance of specific rank to *A. sikkimensis*. This seems the more expedient as Lindley's *A. maculatus* is a somewhat obscure species. It was described and figured by him

in 1841 from a plant of assumed, and no doubt rightly assumed, Indian origin. The figure is evidently inaccurate and contradicts the description especially in so far as the whole plant including the flowers is shown as perfectly glabrous whilst in the text the calyx is said to be glandular-hairy and the corolla pubescent. As the original specimen has not been preserved there is no means of solving the discrepancy. However, relying on the description and the figure as far as it does not contrast with the former I am inclined to identify Lindley's plant with Clarke's variety *stenophyllus* of *A. maculatus*, a native of the Khasia Hills, and easily recognised by its slender habit, narrow, wavy-toothed leaves and the hairiness of the pedicels and calyces.

The plant figured in this place was collected by Mr. Elwes on the eastern slopes of the Singalela range near Darjiling at 1,800 m. Hooker found it at the same altitude, but also as low as 900 m. in the hot valleys below Darjiling. Clarke in his monograph credits Hooker with having collected it from the Balasan river up to Choongtam, 2,500 m., but this is most likely an error. Hooker in his notes says "3,000 to 6,000 ft." Griffith no. 3318 is probably one of the two species of *Aeschynanthus* observed by him above Buxa, East Bengal, just within the Bootan frontier. A further extension of the area of this species is suggested by Prain and Pottinger's enumeration of *A. maculatus* as one of the plants collected by them in the Kachin Hills, in Upper Assam, but I have seen no specimen of this collecting. I may add that the area of the section *Diplotrichium* is as continuous and natural as the group is morphologically homogeneous. It covers the subtropical zone of the outer Himalaya, from Kumaon eastwards, the Khasia Hills and the mountains of south-western China.

The flowers of *A. sikkimensis* are markedly protandrous. They pass through two stages. In the first the filaments are upright with the anthers more or less exserted while the stigma is enclosed in the corolla tube and small; in the second the filaments curve forward and downward and the stigma becomes disc-shaped and exserted above the anthers. Delpino has already described this type of protandry for *A. grandiflorus*, C. W. Parish observed it

in the field as a general occurrence in *Aeschynanthus* and Professor Fritsch's reference to heterostyly in the section *Holocalyx* of *Aeschynanthus* is no doubt reducible to the same phenomenon. It may be useful for growers of *Aeschynanthus* to keep this condition in mind.

A. sikkimensis requires the treatment usual for members of this heat- and moisture-loving genus. Mr. Elwes informs me that he has always grown it in the same house with *Cymbidium*, *Pleione* and *Odontoglossum* and generally succeeded in obtaining germinable seed. Although less gorgeous than its close ally *A. grandiflorus*, *A. sikkimensis* deserves a place in a collection of stove plants on account of its brilliant and fascinating flowers.

O.S.

Fig. 1, flowering branch, nat. size; 2, upper half of corolla flattened out, seen from within, $\times 1.5$; 3, lower half of the same with stamens, $\times 1.5$; 4, calyx (front removed) with lower part of pistil, $\times 4$; 5, style, upper part with stigma in the "male" stage, $\times 4$; 6, pair of stamens, back view, $\times 5$; 7, same, front view, $\times 5$; 8, capsule, nat. size; 9, seed, $\times 20$.

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TAB. 8939.

PRIMULA SINOLISTERI.

China.

PRIMULACEAE. Tribe PRIMULEAE.

PRIMULA, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 631; *Pax in Engl. & Prantl, Nat. Pflanzenf.* IV. I. 105.

Primula sinolisteri, *Bail. i. in Journ. R. Hort. Soc.* XXXIX. 135, 142 (1913) and in *Trans. Bot. Soc. Edinb.* XXVI. 330 (1915); arcte affinis *P. obconico*, Hance, sed petiolis minute puberulis, lamina firmiore minute puberula vel deinde fere glabrata lobulata lobulis glanduloso-denticulatis distincta; etiam cum *P. Listeri*, King, comparanda a qua vero praeter indumentum brevissimum inflorescentia elatiore pluriflora divergit.

Herba perennis, inflorescentiis omissis vix 8 cm. alta, acaulis, indumento omnium partium brevi vel brevissimo, rhizomate duro longo pluricipite dense foliorum vestigiis oblecto, apice foliorum fascicula emittente. *Folia* petiolata; lamina rotundato-ovata vel fere orbicularis, basi cordata, apice obtusa, lobulata, glanduloso-denticulata, 3-4.5 cm. longa, 2.5-4 cm. lata, firme papyracea, viva laete viridis, praeter marginem minute ciliolatum primo aspectu glabra, sub lente vero magis minusve puberula; petiolus gracilis, sed duriusculus, puberulus, ad 6 cm. longus. *Inflorescentia* umbellata, puberula, 8-flora, scapo gracili folia superante ad 12 cm. longo suffulta; bractae lanceolatae vel lineares, ad 6 mm. longae; pedicelli stricti, divaricati, evolutione valde inaequales, tandem ad 4 cm. longi. *Flores* heterostyli, albi vel pallide rosei, ore lutescente vel aureo, suaveolentes. *Flos longistylus*: *Calyx* campanulatus vel obconico-campanulatus, 6-7 mm. longus, 5-lobatus lobis late triangularibus acutis, puberulus, fructifer paulo auctus et late obconicus, ore ad 7 mm. diametro. *Corolla* extra tenuissime puberula; tubus 7-8 mm. longus, cylindricus, parte infrastaminali 2.5 mm. longa angustiore; limbus ad 23 mm. diametro, alte 5-sectus, segmentis obcordatis. *Antherae* circiter 2 mm. longae. *Stylus* corollae os attingens; stigma capitatum. *Flos brevistylus* corollae tubo 10 mm. longo, parte infrastaminali 6 mm. longa cylindrica, suprastaminali ampliata, antheris os fere attingentibus, stylo vix 2 mm. longo, caeteris ut in flore longistylis. *Capsula* vertice convexa, in calyce alte immersa.

A low perennial herb with a creeping, often long, rhizome; rhizome simple or sparingly branched, producing from its top and the tops of the branches dense fascicles of leaves, very closely covered below, with the persistent bases of the leaf-stalks of one or two years' growth, farther back bare. *Leaf-tufts* low, rising hardly 8 cm. above the ground; blades roundish-ovate or almost orbicular, cordate at the base, obtuse, very shortly lobed with the lobes acute or obtuse and minutely toothed and the teeth tipped with hard water-glands, 3-4.5 cm. long, 2.5-4 cm. broad, firmly papery, bright green (cultivated specimens), glabrous to the naked eye,

but seen under the lens mostly bearing loosely scattered white papillae or minute one- or few-celled and occasionally gland-tipped hairs, which, on the back, are usually confined to the nerves, minutely ciliolate along the margins; stalks very slender, almost wiry, up to 6 cm. long, greyish powdery or very delicately downy with the hairs much shorter than the diameter of the stalk. *Inflorescence* raised above the leaves, umbel-shaped, 5-8-flowered, borne on slender peduncles up to 12 cm. long, all parts with a greyish powdery covering of papillae and minute hairs, similar to, but more copious than that of the leaf-stalks; bracts lanceolate to linear, up to 6 mm. long, thinly herbaceous; pedicels very unequal in length owing to the successive development of the flowers, in the spontaneous form up to 1.4 cm. long, in cultivated specimens the longest ultimately 4 cm. long and much spreading. *Flowers* heterostylous, at first white, then becoming pink or faintly mauve, with a pale or bright yellow eye, slightly sweet-scented. *Longstyled form*: *Calyx* bell-shaped or almost obconical, up to 6 mm. long, shortly 5-lobed (to about $\frac{1}{3}$), lobes broadly triangular, acute, often produced into gland-tipped points, very minutely and loosely hairy, when fruiting slightly enlarged and distinctly inversely conical, about 7 mm. wide at the mouth. *Corolla* delicately hairy on the outside; tube 7-8 mm. long, cylindrical, narrower below the insertion of the stamens, that is, 2.5 mm. from the base; limb up to 23 mm. across, deeply 5-lobed, lobes obcordate with a narrow sinus. *Anthers* 2 mm. long. *Style* almost reaching to the mouth of the corolla, like the capitate stigma, turning reddish at length, persistent. *Short-styled form* similar to the long-styled, but the corolla tube longer (10 mm.) and widened into a cup or bell-shaped portion in the upper third at the insertion of the stamens, the anthers reaching to near the mouth of the corolla and the style only 2 mm. long. *Capsule* deeply immersed in the calyx with a convex thinly crustaceous top.

DISTRIBUTION.—South-western China, Yunnan; Tali range, *Forrest* 4101 (original) and mountains of the Mekong-Salween divide, *Forrest*.

Of about a dozen closely related forms clustering around *P. obconica* this is the only one which is at present in cultivation. It appears to possess none of the toxic properties which have made *P. obconica* obnoxious to the horticulturist and may therefore be expected to supplant it in the greenhouse and in table decoration. Sir Isaac B. Balfour has summarized its claims and its chances of becoming a horticultural asset, and we cannot do better than quote his words: "This plant," he says, "is one of the most pleasing of the introductions which we owe to Forrest. Of the obconica-type, it wants the irritant property of *P. obconica*, Hance. In cultivation it forms neat dense tufts of dark green leaves, from amongst which the well-balanced scapes ascend, bearing commonly two tiers of flowers which are typically snow-white. It is not quite hardy about Edinburgh, but I believe it thrives out-of-doors in South England. In greenhouse work it should better *P. obconica*, Hance, and rival perhaps *P. sinensis*, Sabine, and *P. malacoides*, Franch. Grown planted out in a frame it flowers throughout the whole year. In my belief it is a coming horticultural plant. It shows some variation in tint of flower; these are sometimes a pale violet." (Trans. Bot. Soc. Edinb. XXVI, 332, 333.)

Botanically *P. sinolisteri*, and the members of the obconica-group generally, are interesting because they form a good illustration of the problem of the genesis of elementary species or micromorphs ("microforms" of Balfour) and their taxonomic treatment, and secondly because they add to the already numerous instances of the intimate relationship of the floras of western China and the Himalaya. The group ranges from West Hupeh, Szechuan and North-west Yunnan, through Bootan to the Sikkim Himalaya and through the Naga Hills to the highlands of Manipur, and from South Yunnan to the Shan States. Sir Isaac admits not less than 14 members within the group, clearly distinguishable in their prototypes and yet so connected by intermediate forms that the limits of most of them cannot be defined sharply. Some may be modifications due to conditions of environment and have no permanent existence, others may have resulted from crossing and be equally transient.

Practical experience in the field and the garden will eventually lead to the elimination of these as unreliable units of the series. The others will remain and with them the problem. It is impossible to discuss it here for lack of space, and it may therefore suffice to refer the reader to Sir Isaac's suggestive contribution on the constitution of the obconica-group and the position of *P. sinolisteri* in it ("Primula obconica and its micro-forms" in Trans. Bot. Soc. Edinburgh XXVI. 301-344, tt. xxi-lvi).

P. sinolisteri was first introduced into cultivation by Bees Ltd., in 1908, from seed collected by Forrest in 1906. The specimen, however, from which the present plate was drawn was one of several that had been raised at Kew from seed, collected by Forrest on the Mekong-Salween divide, west of Talifu, in 1914 and communicated by Mr. C. J. Williams of Caerhays Castle, Cornwall. They are, compared with the original of the species, quite typical except in so far as the pedicels attain an unusual length, and the leaf-blades lack the glaucescence apparent in Forrest's field specimens. Forrest also notes that the flowers are pure white. In the Kew specimens they are generally white when they open, but become soon suffused with a clear or mauvish pink. *P. sinolisteri* is grown at Kew in a cold frame, where it does quite well without requiring any particular attention.

O.S.

Fig. 1, a whole plant, nat. size; 2, a small section of the midrib of a leaf seen from below, $\times 4$; 3, a section of the leaf margin, $\times 6$; 4, longitudinal section of a flower, $\times 2$; 5, pistil with the posterior half of the calyx, $\times 4$.

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TAB. 8940.

STAPELIA TSOMOENSIS.

South Africa.

ASCLEPIADACEAE. Tribe TYLOPHOREAE.

STAPELIA, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 784; *K. Schum. in Engl. & Prantl, Nat. Pflanzenf.* IV. 2. 278.

Stapelia tsomoensis, *N. E. Brown in Gard. Chron.* XVIII. (1882), 168; valde affinis *S. glabricauli*, *N. E. Brown*, sed floribus minoribus, corollae fundo purpureo-fusco, lobis saepe magis minusve transverse flavido-striatis distincta.

Suffrutex erectus, 10–15 cm. altus. *Caules* quadranguli, inter angulos remote crenatos alte concavi, praeter novellas puberulas glabri. *Folia* minuta, squamiformia, mox evanida. *Cymae* ad caulium bases subsessiles, 4–9-florae, puberulae. *Sepala* lanceolata, acuminata, ad 6 mm. longa, puberula. *Corolla* in alabastro subglobosa, aperta 5–6 cm. diametro, facie e fundo saturate fusco-purpureo pallescens et versus loborum apices transverse flavido-rugulosa, in fundo et ad loborum bases marginesque longe purpureo-pilosa; lobi ovati; acuminati, 2–3 cm. longi. *Coronae exterioris* segmenta oblonga, mucronata, 5–5.5 mm. longa; *interioris* segmenta recurvo-cornuta, in dorso alata, 5 mm. longa, atropurpurea. *N. E. Brown in Hook. Ic. Plant.* t. 1918 (1890) et in *Dyer, Flor. Cap.* IV., 1. 954 (1909); *Berger, Stap. u. Klein.*, 276 (1910). *S. glabricaulis*, *Schlecht. in Journ. Bot.*, 1898, 480, non *N. E. Brown*.

A succulent *shrublet* with many stems rising from the base. *Stems* erect, 4-angled, 1.2–2 cm. in diameter, deeply fluted between the angles, green, the growing points finely downy, otherwise glabrous or sometimes with the down persistent at the angles, these remotely notched. *Leaves* reduced to minute downy scales which soon dry up. *Cymes* springing from the base of the stems, almost sessile, 4–9-flowered; pedicels downy, 1.8–2.5 cm. long. *Sepals* lanceolate, acutely acuminate, up to 6 mm. long, glabrous on the face, ciliate on the margins and with a white down on the back. *Corolla* almost globose in the bud, 2–2.5 cm. in diameter, open 5–6 cm. wide, the back glabrous or finely downy and pale green with purplish tips, the face deep brown-purple in the centre, paler towards the tips of the lobes and marked with fine greenish or yellowish transverse wrinkles, with long purple hairs in the centre and at the base and the margins of the lobes; the lobes ovate, acuminate with the tips recurved. The segments of the *outer corona* oblong, with a minute point at the blunt



TAB. 8941.

PHILADELPHUS SERICANTHUS.

China.

SAXIFRAGACEAE. Tribe PHILADELPHIEAE.

PHILADELPHUS, *Linn.*; *Benth. & Hook. f., Gen. Plant.* I. 642; *Engler in Engl. & Prantl, Nat. Pflanzenf.* III. 2a. 69; *Koehne in Gartenflora*, 1896, 450 *et ss.*

Philadelphus sericanthus, *Koehne in Gartenflora* 1896, 561; affinis *P. incano*, *Koehne*, sed foliis tenuioribus oblongo-lanceolatis longe acuminatis dorso glabris nisi interdum ad nervos et in eorum axillis pilosis distinctus.

Frutex circiter 2 m. altus, ramis primo anno rubro-brunneis deinde fuscis vel canescentibus. *Folia* petiolata; laminae ovato-lanceolatae vel oblongo-lanceolatae e basi plerumque acuta, acute acuminatae, utrinque minute 8-11-dentatae, raro subintegrae, magnitudine valde variae, parvae vel ad 11 cm. longae, plerumque plus quam duplo longiores quam latae, tenuiores, facie virides et parce pilosae vel glabrae, dorso pallidiores et praeter nervos et eorum axillas glabrae, quintupli-nerves; petioli 4-10 mm. longi. *Racemi* numerosi, 4-6 cm. longi, 5-10-flori; pedicelli 4-10 mm. longi, superne vel breviores undique appresse strigillosi, ut etiam receptaculum et sepalorum dorsa. *Sepala* 4, ovata, acuta vel apiculato-acuminata, 4-5 mm. longa, ad margines dense appresse albo-tomentosa. *Petala* nivea, late elliptica vel suborbicularia, obtusissima, 1 cm. longa. *Stamina* circiter 30; filamenta ad 7 mm. longa. *Stylus* ad 7 mm. longus, fere ad medium 3-4-partitus, glaber; stigmata oblonga. *Capsula* 4-locularis, late obovato-turbinata, 5-6 mm. longa, sepalis persistentibus. *Semina* funicularia, ad 3 mm. longa, brunnea. *C. Schneider, Handb. Laubholzk.* I. 370. f. 237, m-o (1906); *Wilson in Plant. Sargent.* I. 145 (1913); *Bean, Trees a. Shrubs*, II. 136 (1914).

A shrub, up to 2 m. high; the epidermis of the branches reddish-brown in the first year, then turning dull brown or greyish, usually still intact in the second year or peeling off here and there in small flakes. *Leaf-blades* rather thin, ovate-lanceolate to oblong-lanceolate from a mostly acute base, acutely acuminate, usually with 8-11 gland-tipped teeth on each side, rarely entire, very variable in size, from a few to 10 (rarely 11) cm. by 2-6 cm., generally more than twice as long as wide, deep green and sparsely hairy or glabrous on the face, paler and glabrous on the back except along the nerves and in the nerve-axils (here sometimes bearded), quintupli-nerved, network of veins very loose, slightly raised and whitish on the back in old leaves; leaf-stalks 6-10 mm. long. *Racemes* numerous, 4-6 cm. long, leafy below, 5-10-flowered, loose; main axis glabrous; pedicels 4-10 mm. long, clothed upwards, or the shorter, like the

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TAB. 8942.

RHODODENDRON BAILEYI.

South Tibet.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. I. 35.

Rhododendron Baileyi, *Balf. f. in Not. R. Bot. Gard. Edinburgh* xi, 23 (1919); affine *R. obovato*, Hook. f., sed foliis maioribus, racemis plurifloris, corolla saturate purpurea, lobis longioribus late ellipticis l-nerviis distinctum.

Frutex humilis, multiramosa; rami ad apices uniuscuiusque anni incrementorum congesti, rigidi, primo dense deinde laxius lepidoti, cinnamomei, l. 5-3.5 mm. crassi, vetustiores cinerascens, cortice laminis tenuibus longis soluto. *Gemmae* parvae, oblongae, densissime lepidotae. *Folia* petiolata, sub anthesi ad ramorum apices congesta, plerumque 7-10; lamina oblonga vel elliptico-oblonga, basi attenuata, apice obtusa, rotundata vel submarginata et mucronulata, foliorum subterminalium 2-4 cm. longa, 1-2 cm. lata, coriacea, foliorum inferiorum citius deciduorum tenuior, ad 6.5 cm. longa, 2.5 cm. lata, omnia plana vel summa margine paulo recurva, facie atro-viridia, dorso primo flavido-viridia, deinde pulchre cinnamomea, utrinque lepidota, squamulis disciformibus facie mox discontiguus dorso maioribus et semper contiguus vel imbricatis; petiolus foliorum superiorum circiter 5 mm. longus, foliorum inferiorum ad 12 mm. longus, dense lepidotus. *Inflorescentiae* terminales, racemosae; gemma ovoidea vel subglobosa, ad 7 mm. longa, squamis late ellipticis obtusis dorso tenuissimis argenteo-pubescentibus et parce lepidotis albo-ciliatis. *Racemi* sessiles, 5-9-flori, rarius ad 14-flori, rhachi 0.5-1.5 cm. longa tenuiter albo-pubescente; bractae oblongae, ad 8 mm. longae, eodem indumento ac gemmae squamae, mox deciduae; pedicelli graciles, 1.5-2.5 cm. longi, versus medium lineari-bracteolati. *Calyx* alte 5-fidus, lobis saepe admodum inaequalibus aliis brevissimis aliis ad 3 mm. longis et oblongis viridibus magis minusve rubro-tinctis dense lepidotis. *Corolla* tubo cupulari 5-6 mm. longo 4-5 mm. lato, limbo rotato 5-loba, extra rubro-purpurea et praeter lorum margines lepidota, intra purpurea, plerumque in lobis 3 posticis atro-violaceo-maculata, glabra vel ad fauces sparse pilosa; lobi late ovato-elliptici, obtusissimi, 8-12 mm. longi, nervo percurrente unico. *Stamina* 10; filamenta subaequalia, purpurea, 3 posteriora praeter basin alte albo-villosa, caetera inferne brevi spatio tantum albo-villosa; antherae aurantiacae, 2.5 mm. longae. *Discus* annularis, viridis. *Ovarium* late conicum, flavo-viride, densissime lepidotum. *Stylus* crassiusculus, deflexus, ruber, 4-5 mm. longus, glaber; stigma disciforme. *Capsula* ovoideo-oblonga vel subcylindrica, 7 mm., longa, lepidoto-furfuracea. *Semina* oblonga, 0.75-0.9 mm. longa, exalata, pallide brunnea.

A small *shrub*, in cultivation up to 1 m. high; branches crowded at the top of each year's growth, rigid, the flowering mostly 10-12 cm. long and 1.5-3.5 mm. thick, cinnamon-coloured, covered with a scurf of circular scales which are contiguous in the younger parts, but separate as the branches lengthen and finally disintegrate more or less, exposing the brightly coloured bark;

older branches up to 9 mm. thick, their bark greyish, peeling off in long thin flakes. *Foliage-buds* small, oblong, contiguously scurfy, or the inner bud-scales loosely scurfy when full-grown, otherwise glabrous, outer bud-scales short, ovate, inner at length carried up on the branch, narrowly oblong, up to 6 mm. long, persistent for some time. *Leaves* stalked, at the time of flowering, mostly 7-10, crowded at the end of last year's growth which bears below the distant scars of 5-7 fallen leaves; blades oblong to elliptic- or obovate-oblong, gradually narrowed into the stalk, blunt, rounded or slightly notched at the tip, which ends usually in a hard point, those of the subterminal leaves 2-4 cm. by 1-2 cm., coriaceous, those of the lower leaves of the growing shoots up to 6.5 cm. by 2.5 cm. and more thinly coriaceous, all flat or slightly recurved along the margins when old, face dark green with a fine discontinuous greyish scurf, back pale yellowish green when young, then cinnamon- or rust-coloured with permanently contiguous or imbricate circular scales; midrib slightly impressed on the face and raised on the back, nerves 4-5 on each side, very faint; stalk about 5 mm., or in the largest leaves of the young shoots, up to 12 cm. long, densely scurfy. *Inflorescence* terminal, racemose; bud ovoid to subglobose, up to 7 mm. long before unfolding; scales broad-elliptic, obtuse, with a very finely silvery down on the back, the outer with scattered scales and a fringe of white hairs. *Raceme* sessile, 5-9- rarely to 16-, flowered; spindle 0.5-1.5 cm. long, finely downy and sparingly scurfy; bracts oblong, up to 8 mm. long, membranous, downy and more or less scurfy and very softly ciliate, early deciduous, leaving very conspicuous crescent-shaped scars; pedicels slender, 1.5-2.5 cm. long, with a bracteole at or near the middle, often red, scurfy, otherwise glabrous; bracteoles early deciduous, linear, very thinly membranous, hairy like the bracts. *Flower-bud* broadly obovoid, to 14 mm. long before opening. *Calyx* deeply 5-cleft, lobes often very unequal, some or all but one reduced to short teeth, the others linear-oblong, up to 3 mm. long, more or less blunt, green, frequently tinged with red or altogether red, scurfy, the longest with some hairs near the tip. *Corolla* with

a short cup-shaped tube about 5-6 mm. long and 4-5 mm. wide at the middle, and with a rotate almost regular 5-lobed limb, 3 cm. across, red-purple outside, violet-purple inside, paler in the throat and with darker spots on the upper 3 lobes, more rarely on all or only on the uppermost lobe, the tube and the base and middle of the lobes covered with yellowish or greenish scales on the outside, glabrous within or the throat finely and sparsely hairy; lobes broad, ovate-elliptic, very blunt, 8-12 mm. by 8-10 mm., mid-nerve running through to the tip, side-nerve (1 on each side) shorter, faint, curving and branching outward from the base. *Stamens* 10; filaments of almost equal length, 8-10 mm. long, purple, glabrous at the base, then white-villous, either for a short distance only (the anterior and lateral) or up to $\frac{2}{3}$ of their length or almost to the anther (the posterior); anthers oblong, 2.5 mm. long, orange-brown. *Disc* a slightly 5-lobed green ring. *Ovary* broadly cone-shaped, truncate, grooved, yellowish-green, densely scaly; style curved down and forward, stout, red, widened below the flat disc-shaped stigma, 4-5 mm. long, glabrous. *Capsule* ovoid-oblong or almost cylindrical when dehiscent, about 7 mm. by 3.5-4 mm., dull brown, scurfy; valves blunt. *Seeds* oblong, 0.75-0.9 mm. long, wingless, with an obscure crest at the upper end.

DISTRIBUTION.—South Tibet, Upper Nyamjang Valley (about 28° N. lat. 92° E. long.), at 3,050-3,250 m., *F. M. Bailey*, 5.

The species figured here belongs to the "Lepidotum series," a group of rhododendrons inhabiting the eastern Himalaya and the high mountain ranges of western Yunnan and mostly confined to altitudes between 2,700 and 4,500 m. It was discovered by Capt. F. M. Bailey in 1913 on his journey to the upper reaches of the Tsangpo river when on his return he passed through the valley of Nyamjang, close to the north-eastern frontier of Bootan. Capt. Bailey preserved no specimens, but communicated seeds of this as of other rhododendrons to the Royal Botanic Garden at Edinburgh, whence distribution was made to other gardens. The specimen from which the plate was prepared was grown in the

garden of Dame Alice Godman at Horsham, but ample material for comparison was also received from Mr. J. C. Williams, Caerhays Castle, Cornwall, and Mr. H. Armytage-Moore, Roswallen, Co. Down. Mr. Williams's specimens were particularly valuable, as it was mainly from his plant that Sir I. B. Balfour described the species.

R. Baileyi seems to be perfectly hardy in this country, and in Cornwall, Mr. Williams writes, it has stood the severe drought of the last summer better than any other rhododendron, even away from shade. It closely resembles *R. lepidotum*, but has a more bushy top borne on slender stems, larger leaves and more brightly coloured flowers. The dark spots of the corolla are mostly confined to the three posterior lobes, but in Mr. Williams's specimens corollas occurred with spots on all five lobes or, on the other hand, only on one lobe. The extent of the villosity of the filaments varies in a similar way but is always more marked in the posterior ones. Sir I. B. Balfour lays some stress on the number of flowers in each raceme, putting it at about 16. I have never seen so many; but there were generally several arrested flower-buds among the perfect flowers so that under favourable conditions a considerable wealth of flowers may be expected. O.S.

Fig. 1, a flowering branch, nat. size; 2, bud of an inflorescence, nat. size; 3, scurf on the back of a leaf $\times 40$; 4, scurf on the face of a leaf, $\times 40$; 5, a corolla cut open and flattened out, nat. size; 6, posticous stamen, $\times 5$; anticous stamen, $\times 5$; 8, calyx with disc and pistil, the front part of the calyx cut away, $\times 5$; 9, fruit, $\times 2$; 10, seed, $\times 40$. Figs. 2, 5, 9 and 10 from Mr. Williams's specimens, the rest from those communicated by Dame A. Godman.

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BULBOPHYLLUM TRISTE.

India.

ORCHIDACEAE. Tribe EPIDENDREAE.

BULBOPHYLLUM, *Thou.*; *Benth. & Hook. f., Gen. Pl.* III. 501; *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 178 (*Bolbophyllum*).

Bulbophyllum triste, *Reich. f. in Walp. Ann.* VI. 253 (1861) et *in Hamburg. Garten-u. Blumenzeit.* 1865, 303 et *in Saund., Ref. Bot.* II. t. 117 (1882); affine *B. densifloro*, Rolfe, sed pseudobulbis depressis, foliis oblongis, floribus plerumque minoribus luride purpureis distinctum.

Herba epiphytica, heteroclada; pseudobulbi in rhizomate ramoso arcte approximati, depressi, cepiformes, ad 1.8 diametro, prasini. *Folia* sub anthesi saepe nulla, postea 2-na, cataphyllis 2-3 vaginiformibus oblique truncatis acutisque brevibus praemissis; laminae oblongo-lanceolatae vel oblongae, breviter acutae, circiter 8 cm. longae, 1.5-1.8 cm. latae, laete virides, molliter carnosulae. *Racemus* spiciformis, magis minusve densus, nutans, 2-3 cm. longus, ad 1 cm. diametro; pedunculus gracilis, vix 12 cm. altior, prope pseudobulbum ortus, squamis 3-4 circiter 5 mm. longis distantibus fuscis praeditus; bractae lanceolatae, tenuiter acuminatae, 2-1.5 mm. longae, scariosae; pedicelli 1 mm. longi. *Receptaculum* circiter pedicello aequilongum. *Sepalum* medianum longum, concavum, roseo-purpureum; lateralialia acroscopica, approximata, per tertias superiores secundum margines interiores cohaerentia, oblonga, obtusa, valde concava, olivaceo-brunnea, leviter purpureo-suffusa, ad 4.5 mm. longa. *Petala* lateralialia oblique ovata, acuta, sepalo mediano similia, sed breviora. *Labellum* cum columnae pede articulatum, explanatum e basi cordata late ovatum, obtusum, in flore vivo basi subplicatum, apice leviter recurvum, crasse carnosum, atro-purpureum, 2.5 mm. longum. *Columna* brevis, trigona, pallida infra rubro-punctata, in pedem incurvum linearem contracta; auriculi angusti triangulares, acuminati, erecti. *Anthera* apice purpureo-papillosa. *Hook. f., Brit. Ind.* V. 768 (1890), *King in Ann. Bot. Gard. Calcutta* VIII. 73 t. 98 (1898). *B. micranthum*, *Hook. f. l. c. et in Hook. Ic. Pl.* t. 2048 (1890). *B. alopecurum*, *Reichenb. f. in Gard. Chron.* 1880, II. 70.

An *epiphytic herb* with a much-branched freely-rooting rhizome and crowded depressed onion-shaped pseudobulbs, up to 18 mm. in diameter, leek-green, often partly whitish owing to the drying up of the old epidermis. *Leaves* mostly in pairs, maturing after flowering, sheathed below by 2-3 short obliquely truncate cataphylls; blades oblong, somewhat narrowed at the base, shortly pointed at the tips, up to 8 cm. by 1.5 cm., softly fleshy, but rather thin, green. *Racemes* spike-like, more or less dense, 2-3 cm. long and 1 cm. in diameter, nodding on slender erect peduncles which arise by the base of pseudobulbs, are up to 12 cm. high and bear 3 or 4 distant acute sheathing scales, brown and about 5 mm. long; bracts lanceolate, tapering to a slender point, dry and

membranous, 2–1.5 mm. long. *Receptacle* about as long as the pedicel, obconical. *Sepals* very unequal, the median broad-ovate, pointed, concave, 2.5 mm. long, purple or rose-purple, the lateral directed towards the top of the raceme, close, free at their base, then cohering along their contiguous margins for three-quarters of their length, very concave, oblong, obtuse, 4–4.5 mm. long, olive-brown and slightly tinted with purple. *Petals* very similar to the median sepal, but much smaller and slightly oblique. *Lip* jointed on the foot of the column, stout, fleshy, concave or grooved on the face up to the flat broad and slightly recurved tip, blackish-purple on the face, tinted with yellow on the back and the margin, broad-ovate from a cordate base when flattened out. *Column* short, trigonous, pale red-spotted at the base and there produced into an incurved linear foot; auricles narrowly triangular, acuminate, erect. *Anther* with minute purple papillae at the top; pollinia globose, bright yellow.

DISTRIBUTION. India, from Sikkim through the Khasia Hills to Lower Burma. Sikkim, in the valley of the Testa, at 450 m., *Pantling*, 129; Khasia Hills, without precise locality, *Thomas Lobb* (the original specimen), *Lt. Williamson*; Lower Burma, Pegu, mountains east of Toungoo, *Parish*, 207.

The subject of this plate is a specimen in the collection at Kew, received from Darjeeling at some time previous to 1914. No date, number or contributor's name is given, but it is not improbable that it was sent by Mr. R. Pantling, who from 1882–1910 lived on the Government Cinchona Plantation at Mungpoo, near Darjeeling, and in 1893 discovered the plant in the Testa Valley below Darjeeling. A sample of this collecting was distributed from Calcutta five years later as a corollary to the description and figure published by King and Pantling in the *Annals of the Botanic Garden at Calcutta*. This is of some importance, because the figure, a reproduction of a water-colour-drawing by Pantling, is rather crude, and might suggest an error in identification; the specimens, however, leave no doubt as to its identity with the original of *B. triste*, an introduction of Thomas Lobb's from the Khasia Hills, dating probably back to the fifties. Sir J. D. Hooker queried the Khasia locality

in Lindley's Herbarium and in the general collection at Kew, and in Flora of British India he quoted Lobb, along with Parish and Berkeley, as having collected the plant in Tenasserim; but as Lobb was in the Khasia Hills early during his second journey to the East and *B. triste* was subsequently (about 1870) found there by a Lieutenant Williamson, a correspondent it seems of P. H. Gosse, there is no reason to suspect Lindley's labelling. Another extension of the area of our *Bulbophyllum* is indicated by specimens collected by the Rev. Charles Parish, British Chaplain at Moulmein, Tenasserim. This active and acute orchidologist discovered them growing on a granite rock between Santadeu and Plummadeu on the route from Toungoo to Nat Toung, a mountain on the border of the Karen country, on Feb. 1, 1868. He distributed them as *B. corrugatum*, Parish, but Reichenbach identified them subsequently with his *B. triste*. These specimens are supplemented by an excellent coloured drawing made on the spot. Another drawing representing the same plant, but from Ta-ok, is dated January, 1871. I have not been able to trace Ta-ok, but so much is evident that the southern limit of the area, as we know it at present, lies somewhere in Lower Burma. Hooker also quotes Berkeley as a collector of our plant. The specimen attributed to him in the Kew collections is dated 1885 and came probably from the General's garden at Bitterne, Southampton. Parish wrote up all the specimens and drawings referred to above as *B. corrugatum* in spite of certain differences in the size and colour of the flowers and their more or less dense arrangement, but Hooker saw in them a mixture, and referred one of the specimens from the granite rock and the corresponding drawing to *B. triste*, whilst he made the other and the Ta-ok drawing the basis of a new species, *B. micranthum* (see Hooker's *Icones Plantarum*, t. 2048). From my observations on the living plant figured here I am inclined to consider *B. micranthum* as a state of *B. triste* with looser racemes and slightly smaller flowers, differences which are probably due to age, the racemes actually opening out and the sepals and petals shrinking as the plant is flowering off. *B. alopecurum* of Reichenbach seems to be another synonym of *B. triste*. It was very briefly described by Reichenbach

in Gardeners' Chronicle (1880) from specimens received by Mr. Stuart Low from Burma, and there is a coloured drawing of it in Day's collection at Kew. The latter resembles so much another drawing prepared at Calcutta from a plant communicated by Mr. G. Barton Groves, of Rangoon, in 1885, that it is not unlikely that Low's and Groves's plants came originally from the same source. The only difference I can see between *B. alopecurum* and typical *B. triste* is in the more purple and plumper flowers of the former.

The affinity of *B. triste* is clearly with *B. densiflorum*, a species described by the late Mr. Rolfe in the Gardeners' Chronicle (1892, II. 150) and said to be a native of the eastern Himalaya. So great is the similarity of its flowers, at least in dry specimens, to those of robust samples of *B. triste* that Rolfe, in a note with one of the specimens, remarks that it may only be a form of it. However, its oblong pseudobulbs, its lanceolate-oblong rather than oblong leaves, and the green and yellow colouring of the flowers, distinguish it sufficiently from *B. triste*. The sombre colour of the flowers—hence the epithet *triste*—is peculiar, as it is made up of an almost pure rose-purple in certain parts and a suffusion of purple on a green and yellow ground in others. The way in which these colours alternately gain and lose in prominence, according to the amount of light they receive, is striking and it baffled the artist for some time. At Kew *B. triste* is grown in a pot, but Saunders says that if placed on a block with some moss attached to it, and kept in the shade, it soon overruns the block and blossoms freely. It flowers at Kew early in the spring and the first leaves begin to push through their sheathing cataphylls at the same time, or slightly later, attaining to their full size in July. In its home flowering sets in a little earlier, but there seems to be a more decided interval between flowering and leaf-development, which explains why flowering specimens collected in the field are always without any traces of leaves. O.S.

Fig. 1, a cluster of pseudobulbs and flowering scapes, nat. size; 2, a young pseudobulb with fully developed leaves, nat. size; 3, a flower in its position in the drooping raceme, $\times 8$; 4, a flower with one lateral and half a medium sepal and a petal cut away, $\times 8$; 5, lip pressed flat and seen from the back, $\times 8$; 6, column and anther seen from the back, $\times 8$; 7, anther with pollinia, $\times 30$.

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TAB. 8944.

SYMPHYTUM GRANDIFLORUM.

Caucasus.

BORAGINACEAE. Tribe ERITRICHIEAE.

SYMPHYTUM, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 854; *Gürcke in Engl. & Prantl., Nat. Pflanzenf.* III. 3 a. 112; *Bucknall in Journ. Linn. Soc.* XLI. 491-585.

Symphytum grandiflorum, DC., *Prodr.* X. 40 (1846); affine *S. cordato*, Waldst. & Kit., sed humile, foliis multo minoribus basi rotundatis rarius subcordatis magis asperis, ramis sterilibus decumbentibus, calycibus minoribus dentibus a basi subulato-linearibus distinctum.

Herba perennis, caespitosa, ad 20 cm. alta; rhizoma intricatim multiramosum, ramos steriles decumbentes radicanter et 1-2 florentes e basi ascendentes emittens. *Caulis* simplex vel rarius parce ramosus, retrorsum strigillosus vel superne hispidus. *Folia* ovata, basi rotundata vel subcordata, breviter acuminata, caulium floriferorum 4 cm. vix excedentia, sterilium multo maiora, deinde ad 18 cm. longa, ad 7 cm. lata, supra breviter strigillosa, dorso hirsutiuscula; petioli caulium floriferorum raro ad 3 cm. longa, superiorum brevia, sterilium ad 18 cm. longa. *Cincinni* saepe 2, basi foliis 2 sessilibus vel subsessilibus suffulti, ebracteati, post anthesin ad 5-7 cm. elongati; pedicelli brevissimi vel ad 7 mm. longi, hispiduli. *Calyx* 4-5 mm. longus, alte 5-fidus, lobis lineari-subulatis strigilloso-ciliatis. *Corolla* tubulosa limbo porrecto brevissimo, 12-20 mm. longa, glabra, in alabastro apice rubra, aperta pallide lutescens; tubi pars supstaminialis subcampanulata, 4-6 mm. diametro, fornicibus linearibus 3 mm. longis inclusis, lobis limbi perlatis, vix 15 mm. longis. *Filamenta* antheris paulo breviores. *Stylus* demum exsertus et ad 16-22 mm. longus. *Nuculae* ovoideae, subacutae, fere 3 mm. longae. *Ledeb., Fl. Ross.* III. 116 (1846-51); *Boiss., Fl. Or.* IV. 172 (1879); *Wocke in Gartenwelt*, VII. 292 (1903); *Kussnez. in Act. Hort. Petrop.* 1910, 45, f. 12; *Bucknall in Journ. Linn. Soc.* XLI. 548 (1913). *S. cordatum*, M. Bieb., *Fl. Taur. Cauc.* I. 130 (1808), non Waldst. & Kit.; *S. ibericum*, Stev. in litt. ex M. Bieb. l.c. III. 647 (1819) et in *Mosc. Nat. Bull.*, XXIV. 579 (1851).

A perennial herb, growing in large tufts, up to 15 or 20 cm. high, with intricate branched underground-stems which at the beginning of the year throw up 1 or 2 flowering and several barren branches from their ends; the barren shoots becoming decumbent as they elongate, rooting and during the summer forming tufts of large leaves at their tips, whilst their lower portions become drawn into the ground, adding thus to the underground growth; flowering stems erect from an ascending base, mostly simple, retrorsely strigose or hispid higher up. *Leaves* stalked or the upper almost sessile; blades ovate from a rounded or slightly cordate or more rarely suddenly constricted and wedge-shaped base, shortly

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PHELLODENDRON LAVALLEI.

Japan.

RUTACEAE. Tribe TODDALIEAE.

PHELLODENDRON, Rupr. in Bull. Phys. Math. Petersb. XV. 353 (1853); *Benth. & Hook. f., Gen. Pl.* I. 301; *Engl. & Prantl, Nat. Pflanzenf.* III. 4. 175.

Phellodendron Lavallei, Dode in Bull. Soc. Bot. France, LV. 648 (1909); arcte affine *P. sachalinensi*, Sarg., et *P. amurensi*, Rupr., sed ab utroque foliis in dorso ad costam nervosque primo dense deinde laxo albo-pilosis, ab hoc praeterea foliis paulo maioribus ovato-lanceolatis distinctum.

Arbor dioica; truncorum vetustorum cortex nigricans, asper, strato exteriori tenui suberoso. *Folia* plerumque impari-pinnata, pinnis 7-11; rhachis pedunculo incluso 10-20 cm. longa, subteres, glabra vel subglabra; foliola ovato-lanceolata, acute acuminata, obsolete crenulata, inferiora 4-7 cm. longa, 2-5 cm. lata, superiora ad 12 cm. longa, 4 cm. lata, dorso ad costam nervosque albo-pilosa, ad marginem tenuiter albo-ciliata, pilis primo densis tandem laxioribus; petioluli breves nisi terminalis interdum 2 cm. longus vel longior. *Panicula* subcorymbosa, ad 6 cm. alta, ad 8 cm. diametro, pedunculo glabro 5-8 cm. longo: rami, ramuli, pedicelli rufo-puberuli; cymae congestae. *Calyx* rufo-puberulus, segmentis 5 ovato-lanceolatis 1 mm. longis. *Petala* virescentia, oblonga, 3.5 mm. longa, intra albo-pilosa. *Stamina* in flore ♂ antheris exsertis, filamentis basin versus pilosulis; in flore ♀ ad staminodia breviter reducta. *Pistillum* in flore ♂ ad carpella 5 basi connata dense albo-pilosa sterilia reductum; in flore ♀ ellipsoideum, 5-6-loculare, glabrum, glandulosum, stigmatibus subsessilibus discoideo. *Drupa* globosa, nigra, ad 1 cm. diametro; pyrenae 5 vel abortu pauciores, endocarpio tenuiter crustaceo. *Semina* oblique ovoidea, 4-5 mm. longa, testa crustacea atra foveolata. *P. amurense* var. *Lavallei*, Sprague in Kew Bull., 1920, 235.

A deciduous tree with obliquely spreading branches and rather short, stout, crowded branchlets, forming a wide crown; bark (of trees 20-25 years old) sooty-grey to almost black, with longitudinal cracks, corky to a depth of 3-5 mm., areas between the cracks more or less fissured from the edges and at a right angle to them, rough, but not reticulate; young branches at first chestnut- to yellowish-brown, lenticellate, then turning dark-grey and cracking from the lenticels. *Winterbuds* silvery-silky or purplish-silky whilst concealed in the bases of the leaf-stalks, then rusty-pubescent. Leaves deciduous, opposite, unevenly (rarely evenly) pinnate, with 3-5, rarely more, pairs of opposite leaflets; rhachis, including the leaf-stalk, which is 4-9 cm. long, almost round, glabrous, or with a few scattered hairs; leaflets

ovate-lanceolate from an unequal rounded or shortly acute, or the terminal from a wedge-shaped-base, tapering to an acute and mostly slender acumen, obscurely and minutely crenulate with a pellucid water-gland in each notch, the lowest pair 4-7 cm. by 2-5 cm., the following gradually longer, to 12 cm. by 4 cm., dark green on the face, paler and almost glaucous on the back, turning yellow in the autumn, with soft white hairs on the back along the midrib, particularly near the base, and on the nerves and margins, the hairs of the unfolding leaves often so dense as to form silvery lines, at length loose; lateral nerves about 10-12 on each side, very slender, veins delicately netted; stalks of the lateral leaflets very short, of the terminal from a few to 20 mm. long. *Panicles* almost corymbose, up to 6 cm. long and to 8 cm. across, borne on glabrous peduncles 5-6 cm. or ultimately up to 8 cm. long, more or less pendulous when fruiting; axes rusty-puberulous or almost glabrous downwards; lowest branches undivided up to 3 or 4 cm., then, like the upper, bearing the flowers in rather crowded cymes; bracts minute or obsolete; pedicels very short in flower, at length 3-5 mm. long and rather stout. Male: *Calyx* 5-cleft, rusty-puberulous; segments ovate-lanceolate, acute, not much over 1 mm. long. *Petals* slightly imbricate in bud, obliquely erect in the open flower, oblong, blunt, almost boat-shaped, about 3.5 mm. long, yellowish-green, glabrous on the back, hairy to almost villous on the face along the midrib. *Stamens* shortly exerted; filaments hairy towards the base, 4 mm. long; anthers almost 2 mm. long. *Ovary* barren, of 5-6 downwards united carpels, densely tomentose with the exception of the rudimentary styles. Female: *Calyx* and *petals* very similar to those of the ♂ flower, but the latter more green on the back with inflexed tips. *Stamens* reduced to staminodes not much over 1 mm. long with rudimentary anthers. *Ovary* more or less ellipsoid, 5-6 celled, glandular, green, drying black; stigma sessile, discoid, obscurely 5-6 lobed, brownish-red. *Ovule* 1 in each cell, pendulous, anatropous. *Fruit* a globose drupe, up to 10 mm. in diameter; black, glossy; flesh adhering to the stones, black, juicy, very aromatic; stones 5 or fewer by abortion, attached to a woody

persistent central columella; the stone-shells crustaceous, thin, pellucid, at length splitting into 2 valves. *Seed* obliquely ovate in outline, laterally somewhat compressed, rounded at the base, 4-5 mm. by 3 mm.; seed-coat crustaceous, pitted, black; hilum filiform, depressed. *Embryo* erect, surrounded by a thin layer of fleshy albumen.

DISTRIBUTION.—Japan; Hondo, in subalpine woods in the province Rikuchu (Nambu), Tschonoski, a. 1865, and no doubt in other places.

For a long time only two species were recognized in the genus *Phellodendron*, namely *P. amurense*, Rupr. (1853) from the Amur, and *P. japonicum*, Max. (1871) from Central Japan; but in 1909 M. Dode, in his revision of the genus, proposed seven species, two of them segregates of *P. amurense* and three new additions from Central China. The plant figured here represents one of those segregates. It was discovered by Maximowicz's native collector, Tschonoski, in the subalpine woods of the province Rikuchu, in north-eastern Hondo, in 1865. Early in the following year seeds of a "*Phellodendron nov. spec.*" collected by Tschonoski in 1865 were distributed from Petrograd, and it is very probable that they were of the same origin. This would fix 1865 or 1866 as the date of the introduction of *P. Lavalleyi* into European gardens. It became, however, almost at once merged in *P. amurense*, under which name Tschonoski's herbarium specimens were distributed, and as the genuine *P. amurense* had been brought to Europe only nine years before, it is now very difficult to trace the history of our plant. Dode described *P. Lavalleyi* from a tree in Lavallée's arboretum at Segrez (Seine et Oise). This may be the one enumerated as *P. amurense* in the Catalogue of the Arboretum of 1877 and noted by Sir Joseph Hooker in the Kew copy of the Catalogue as having been received from Van Volxen in 1873. The earliest British records are those of a tree grown at Kew in 1881, but no longer existing, with the label and the name "Regel 137, *P. japonicum*," and of another in Smith's nursery in Worcester in 1882. The Arnold Arboretum appears to have raised *P. Lavalleyi* from seed

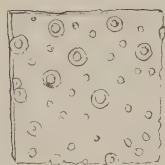
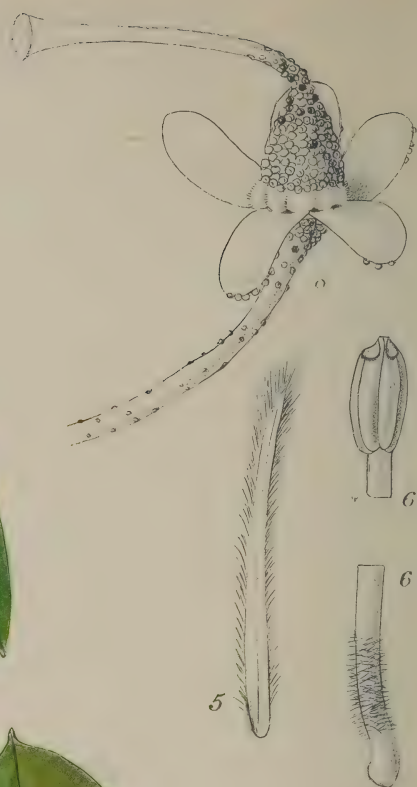
received from Segrez in 1879. The tree which supplied the material for the present plate stands near the western wing of Cambridge Cottage, in the Royal Botanic Gardens at Kew, and is considered to have come from the Arnold Arboretum. It is 20-25 years old and about 9 m. high, with a girth of over 50 cm. at breast height.

P. Lavallei is one of the two proposed segregates from *P. amurense*, the other being *P. sachalinense*, Sarg. Their taxonomic status is debatable. To me they seem to represent fixed genetic units, different enough to be treated as species, and Mr. E. Wilson, who had recently an opportunity of studying them in their home, assures me that *P. Lavallei* has there all the appearance of a distinct species. Mr. Sprague, on the other hand, in a paper in the Kew Bulletin of 1920, treats *P. Lavallei* and *P. sachalinense* as "varieties" of *P. amurense*. The tree at Kew yields an abundance of fruit with well developed seeds, although there is no male *P. Lavallei* in the Gardens, and its distance from the males of other species of *Phellodendron* is very considerable. The seedlings which have sprung up from last year's crop have still (August, 1922) their juvenile 3-foliolate leaves, which, in contrast with the leaves of the adult tree, are almost entirely glabrous. *P. Lavallei* is perfectly hardy at Kew and will no doubt thrive generally in this country, as it and *P. amurense* and *P. sachalinense* do on the Continent. The tree is worth a trial, as its handsome appearance, its fine foliage, which turns to a rich golden yellow in the autumn, and its abundance of grape-like fruit recommend it equally for park and roadside. Writers on the flora of Japan have repeatedly referred to "*P. amurense*" as a tree of considerable height and useful for timber and the preparation of cork and a yellow dye. As this "*P. amurense*" includes *P. Lavallei*, there is little doubt that those references apply at least in part to our tree.

O.S.

Fig. 1, fruiting branch, nat. size; 2, a leaflet, back view, nat. size; 3, part of a leaflet with glands in the notches of the margin, $\times 3$; 4, part of a male inflorescence, nat. size; 5, male flower, $\times 6$; 6, part of a female inflorescence, nat. size; 7, female flower, $\times 6$; 8, fruit, $\times 2$; 9, seed, $\times 4$. Figs. 4 and 5 from a herbarium specimen collected by Tschonoski.

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TAB. 8946.

RHODODENDRON SULFUREUM.

South-west China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, Linn.; *Benth. & Hook. f., Gen. Plant.* 599; *Drude in Engl & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron sulfureum, Franch. in *Bull. Soc. Bot. France*, XXXIV. 283 (1887); affine *R. megerato*, Balf. f., sed foliis maioribus margine glabris, floribus umbellatis, calyce minore fere ad basin diviso, corollae lobis minoribus distinctum; etiam cum *R. brachyantho*, Franch., comparandum a quo vero foliis maioribus dense glandulosis, corollae aureae limbo subrotato maiore differt.

Frutex 6-12 dm. altus, ramis tortuosis vel strictis, incremento annuo ad 10 cm. longo, glabris, hornotinis primo viridibus atro-rubro- vel rubro-lepidotis deinde brunnescentibus tandem cinerascens, cortice squamis tenuibus albidis soluto. *Gemmae* oblongae, subacutae, 8-10 mm. longae, squamis exterioribus 8-10 late ovatis vel oblongo-ovatis obtusis dorso subcoriaceis lepidotis margine minute ciliolatis. *Folia* petiolata, cum floribus coetanea; lamina elliptica, utrinque subobtusata, apiculo duro, 4-7 cm. longa, 2.5-3.5 cm. lata, coriacea, margine leviter recurva, supra viridis, elepidota, infra glauca, squamulis numerosis vineis vel succineis 0.2 mm. diametro metientibus in epidermate glauco papillis albidis cereis compacte induto fere immersis, costa supra tenui subtus crassiuscula prominente, nervis utrinque 7-8 tenuibus; petiolus crassus, teres, 7-12 mm. longus, dense lepidotus, caeterum glaber vel raro laxe breviter pilosus. *Inflorescentiae* gemma globoso-obovoidea, 2.5 cm. longa, ad 2 cm. diametro; squamae numerosae, rotundato-obovoideae, obtusae vel obtusissimae, mucronulatae, longiores 10-14 mm. longae et ad 12 mm. latae, papyraceae, dense niveo-ciliatae, viridi-flavae, ad margines apicesque magis minusve rubrae, lepidotae, per anthesin diu persistentes, sed ante eam peractam deciduae. *Flores* 5-8, umbellatim congesti; bractae filiformes, 6 mm. longae, laxae albo-sericeae; pedicelli inaequales, ad 18 cm. longae, lepidoto-verrucosi. *Calyx* fere ad basin 5-sectus; sepala oblongo-vel obovato-elliptica, obtusa, 3.5-5.5 mm. longa, membranacea, flavo-viridia, rubro- vel succineo-lepidota, margine laxe fimbriata vel nuda. *Corolla* aurea, extra magis minusve lepidota, subcampanulata, limbo fere rotato; tubus latus, circiter 7 mm. longus, basi 5 mm., ore ad 10 mm. diametro; lobi suborbiculares, 8-10 mm. longi, posteriores parce punctati vel uti caeteri unicolores. *Stamina* 10; filamenta subaequalia, ad 8 mm. longa, basi per 2-2.5 mm. albo-sericeo-pilosa; antherae late oblongae, 3 mm. longae, ferrugineae. *Discus* annularis viridis. *Ovarium* ovoideum vel ellipsoideum, 5-loculare, densissime succineo-lepidotum, squamulis crassiusculis. *Stylus* antrorsum decurvatus, crassiusculus, 6 mm. longus, basi parce lepidotus. *Capsula* ovoidea, 8-10 mm. longa, 5-valvata. Forrest in *Not. Bot. Gard. Edinb.* VII. 66, 210 (1912) et 393 (1913); Millais, *Rhodod.* 100, 249 (1917).

A low *shrub* with glabrous branches which are green when young and like most parts of the plant studded with dark-red or amber-coloured sessile glands. The *leaf-buds* are oblong, more or less acute and 8-10 mm. long and have blunt minutely ciliate outer scales. The

leaves which are fully developed at the time of flowering are born on stout densely glandular and sometimes hairy stalks, 7-10 mm. in length ; their blades are elliptic, blunt with a hard peg-like terminal water-gland and measure 4-7 cm. by 2·5-3·5 cm., they are leathery with recurved margins and their upper and lower sides contrast much in colour and covering, the upper side being dark green and devoid of glands and papillae, whilst the lower side is whitish-glaucous with a compact layer of white waxy papillae in which the numerous glands are more or less immersed. The umbel-shaped 5-8-flowered *inflorescences* arise from globose to inversely ovoid buds, 2·5 cm. long, whose numerous scales drop tardily from the very short and stout axis leaving it completely covered with their scars, the scales being rounded or ovate, very blunt and 10-14 mm. long and almost as wide, of papery consistence and yellowish-green with a showy fringe of snow-white cilia ; the flower-stalks are up to 18 mm. long and have filiform loosely silky bracts at their bases. The *calyx* is 5-cleft almost to the base, its segments being more or less elliptic, 3·5-5·5 mm. long, membranous and yellowish-green with bare or loosely fimbriate margins. The *corolla* is bright yellow and shortly bell-shaped in its tubular portion whilst the limb is flat and wide, measuring 2·5-3 cm. in diameter, its lobes are almost orbicular and the posterior frequently spotted with red dots. There are 10 *stamens*, all with silvery hairs at the base of their filaments which are up to 8 mm. long ; the anthers are rust-coloured. The *ovary* is surrounded at the base by a green ring-shaped disc, densely glandular and 5-celled ; the stout style curves forward and downward. The *capsule* is ovoid and 8-10 mm. long, it opens widely with 5 broad-lanceolate valves.

DISTRIBUTION.—West Yunnan, mountains above Tali from 2,500 to 3,000 m., *Delavay* 2212 (original), *Forrest* 4143 ; Mekong-Salwin divide from 3,000 to 3,300 m. *Forrest* 951.

The rich golden yellow of the flowers and the sharply contrasting colours of the upper and lower sides of the leaves render this rhododendron the most charming of

the smaller yellow-flowering species of the genus. Although introduced into cultivation only quite lately *R. sulfureum* has been known to the botanist for over 35 years. It was originally described by Franchet in 1887 from specimens collected by Delavay in the preceding year. This indefatigable collector discovered it in flower in April in the bush at the foot of Tsang Shan above Tali at an elevation of 2,500 m., which is practically the same locality where in November, 1905, at a higher elevation (2,700-3,000 m.), Forrest obtained the seed from which the specimens figured here were raised. The following year he also found it on the Lu Pa pass in the Mekong-Salwin divide at a similar altitude. He describes the habitat as "shady situations on the margins of pine forests and cane breaks" (Lu Pa pass) and as "moist shady ledges of cliffs" (Tali).

Of the species with which *R. sulfureum* has been contrasted above, *R. megeratum* too occurs on the Mekong-Salwin divide. But it also extends to the high mountains between the Mekong and the Yangtse north of Tali whilst the area of *R. brachyanthum* coincides with that of *R. sulfureum*. To look for further affinities we have to turn to the *trichocladum*-type which is represented by a group of species characterised by deciduous leaves which develop after flowering. Of these *R. trichocladum* inhabits roughly the same area, but the other members of the group are confined to the western portion of it excepting one species which extends to Upper Burma. *R. brachyanthum* has been figured in the Botanical Magazine (see Tab. 8750). It is easily distinguished by the loosely scattered scale-glands of the leaves and the more distinctly bell-shaped corollas and their non-rotate smaller limb. Fig. 1 of the present plate was drawn from a specimen communicated by Mr. J. C. Williams of Caerhays Castle, Cornwall, at the end of April of last year, the remaining figures are from material supplied by Mr. E. J. P. Magor of St. Tudy, Cornwall, later in the year. Ordinarily, however, Mr. Magor informs me, flowering begins in March. The tardiness with which the scales of the inflorescence-buds fall away in the cultivated plant (compare Figs. 1 and 2) also manifests itself in the herbarium specimens at Kew. According

to Mr. Magor and Mr. Williams *R. sulfureum* is fairly hardy in Cornwall, although the flowers suffer somewhat in cold weather. Mr. Magor grows it in the ordinary soil of his garden, that is, heavy loam with the addition of some leaf mould and granite gravel. O.S.

Fig. 1, a young inflorescence, nat. size ; 2, a fully open inflorescence, nat. size ; 3, a fragment from the back of a leaf, showing the distribution of the scale-glands, $\times 40$; 4, a single scale-gland, $\times 80$; 5, a bract from the base of a flower-stalk, $\times 4$; 6, stamen with anther in front view, $\times 6$; 7, anther in back view, $\times 6$; 8, pistil with disc and calyx, $\times 4$.

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EUPHORBIA ANOPLIA.

South Africa.

EUPHORBIACEAE. Tribe EUPHORBIEAE.

EUPHORBIA, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 258; *Engl. & Prantl, Nat. Pflanzenf.* III. 5. 103.

Euphorbia anoplia, Stapf (sp. nov.); affinis *E. Morinii*, Berger, et *E. polygonae*, Hort., sed plane inermis costis crasse dentatis et cyathiis sessilibus. Illa praeterea differt caulibus parce patule ramosis, costis 1 cm. tantum latis, cyathiis 4 mm. diametro, involucri lobis fimbriatis; haec caule validiore, costis 10-13 latoribus.

Planta cereiformis, dioica, ad 18 cm. alta. *Caules* e basi solo tecta fasciculati; primarius circiter 5 cm. diametro, 5-9-costatus, obscure viridis; costae subverticales vel leviter tortae, sectione transversali triangulari basi 12-14 mm. lata, lateribus laevibus leviter convexis, sulcis acutis, iugis dentatis inter dentes subrectis, dentibus breviter pyramidalis induratis acutis subdeflexis 4-6 mm. distantibus folia mutata referentibus; caules accessori juniores pro rata crassiores, costis minus altis 5, dentibus magis conspicuis. *Folia* iuniora lamellam minutam apiculiformem gerentia, mox mutata, purpurascencia. *Cymae* in apice caulis congestae, in iugis transversae, ad cyathium perfectum solitarium sessile utrinque rudimento cyathii minuto stipatum reductae, bracteatae, demum cicatriculas transversas a folio (dente) subtendente remotas relinquentes; bractae carnosulae, magis minusve purpurascens vel vinoso-purpureae, dorso minute pubescentes, imae minutae, acutae, superiores 2-4 mm. longae, late ellipticae, obtusae. *Cyathium* ♂ breviter turbinatum vel fere hemisphaericum, 5-6 mm. altum, 7 mm. diametro. *Involucrum* utrinque glabrum vel extra minutissime pubescens flavo-viride nisi superne purpurascens, 5-lobum, 5-glandulosum, lobis transverse late ellipticis dentatis 1-5 mm. altis 2 mm. latis purpureis minute pubescentibus, glandulis transverse ellipticis integris carnosulis diametris 1-5 mm. et ultra 2 mm., atro-purpureis vel hepaticis. *Bractae* intravolucrales numerosissimae, lineares et tenuissime laciniatae vel capillares, villosae, villis intricatis ex involucri subexsertis. *Flores* ♂ pedicellis bracteis subaequantibus suffulti. *Filamentum* ad 1 mm. longum, rubrum; anthera 2-loba, 1 mm. lata, ante dehiscentiam aurantiaca, deinde atro-purpurea; pollen aureum. *Flos* ♀ nullum nequidem rudimentarium. *Cyathium* ♀ ignotum.

A dioecious "cactoid" plant with loosely tufted columnar boldly ribbed spineless stems of varying size. *Main stem* up to 18 cm. by 5 cm. with 7-9 ribs which are separated by wide acutely angled grooves and bear on their narrow crests sharp or, at length, blunted teeth at intervals of 4-6 mm.; the teeth, which are the indurated bases of much reduced leaves, are stout, pyramidal and horizontally spreading or slightly deflexed; the accessory stems are usually very short, relatively stout and their ribs (5) are less prominent and more

conspicuously toothed. The *leaf-blades* are only visible in the more vigorously growing apical portion of the stem; they are mere awl-shaped points which wither away early. The *cyathia* or *flower-heads* arise in groups of 3 across the ridges of the ribs on and near the top of the old stems; of these only the central one of a group develops while the lateral persist as often very minute buds. The *full-grown cyathia* are sessile, more or less hemispheric and supported by a succession of green to purple minutely pubescent bracts, increasing in size upwards; they are unisexual without a trace of a female flower in the male. The *involucre* is 5-lobed with 5 fleshy gland-like appendages between the toothed purple and delicately downy lobes; the glands are transversely elliptic, entire and blackish-purple and placed almost horizontally. The whole of the involucre of the male is packed with numerous fine silky-haired *bracts* and *male flowers* rising from among them. The persistent *pedicels* of the latter are 2-3 mm. long and pale yellow, showing off conspicuously from the short red *filaments*. The *anthers* are rather large and orange-coloured at first, but shrink and turn dark when they open and expose the golden-yellow pollen.

The plant which is represented here was communicated to the Editor by the late Mr. Elwes, who stated that he obtained it from "the old collection of J. Corderoy," but that its earlier history was unknown. Subsequently Mr. Elwes with his usual generosity handed the plant over to the Royal Botanic Gardens at Kew where it is at present. There, in the previous year (1920), a plant obviously specifically identical with Elwes's had been received from Mr. Taylor of Southborough, Tunbridge Wells, who had had it in his possession since 1897 and believed it to be an undescribed species. Mr. Taylor writes that he also had other specimens of the same species from English growers of succulent plants and that one of those specimens was named *E. Morinii*. As *E. Morinii* was distributed in 1897 or thereabouts by the firm of Haage and Schmidt of Erfurt, I wrote to Herrn. F. A. Haage, jun., who kindly informed me that his firm had *E. Morinii* from "Rebut, St. Remy de

Provence." An enquiry directed to that place has up till now remained unanswered. There can, however, be no doubt that the plant is of South African origin as it belongs to a group of euphorbias confined to the southern parts of Cape Colony. Although the name *E. Morinii* appeared in F. A. Haage's Catalogue as early as 1897, and the species was referred to by A. Berger in the *Monatsschrift* for *Kakteenkunde* in 1902 as belonging to the group of *E. cereiformis*, it was not described until five years later (see Berger, *Sukk. Euph.* 98). Unfortunately Berger's description does not tally with our plant, and as Herr Berger says that he had the plant from which he described his *E. Morinii* from Haage and Schmidt, we must assume either that the species is very variable or that two species were originally distributed under the name *E. Morinii*. Mr. Taylor and Herr F. A. Haage, jun., assure me that their specimens of the "*anoplia*"-type have, during the twenty-five years they have been under observation, not shown any tendency to variation in the direction indicated. It seems, therefore, reasonable to distinguish the present plant as a distinct species differing from *E. Morinii*, as described by Berger, in its spineless, coarsely toothed, broad-ribbed stems and sessile flower-heads. I have contrasted it also with *E. polygona*, as it is known in gardens. It is, however, doubtful whether this is the *E. polygona* which Haworth described in his *Miscellanea*, 184 (1803), as a plant with closely set (*contigui*) spreading black spines, about 12 mm. long, minute leaves, entirely of the nature of spines (*omnino natura spinarum*), solitary peduncles and involucre with bifid lobes. No specimen or figure of Haworth's plant having been preserved the species remains for the present a "*species dubia*."

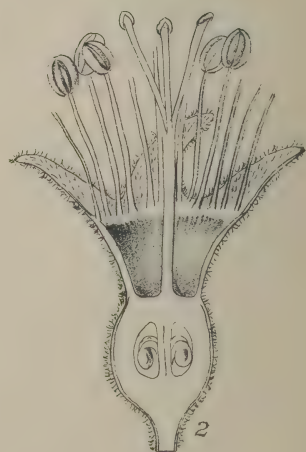
E. anoplia belongs to a group of cactoid euphorbias characterized by the extreme reduction of their leaves, which are moreover not accompanied by stipules, and the very general presence of spines which morphologically are modified axes of inflorescences; hence the name of the group, *Anthacantha*. Some of the earliest introductions of South African euphorbias from the Cape belong here as *E. cereiformis* (1679), *E. mamillaris* (1703), *E. heptagona* (1717) and others. The spines of these species

may be barren or they may start as flower-bearing peduncles, then harden and persist after the fall of the flowers or fruits. The extent to which a specimen is armed with such spines varies in certain species, but without continued observation it is difficult to say how far gaps in the armature or general scantiness of spines are due to the casual or zonal suppression of the flowering axes or to their reduction to sessile flower-heads which would ultimately disappear without leaving a spine behind. In some species sessile flower-heads and spines occur simultaneously. In *E. anoplia* the latter have disappeared entirely. In that respect it conforms with the group of *E. meloniformis* and *E. obesa*, but here the body is so rounded off in all directions as to exclude the suggestion of close affinity with *E. anoplia*.

E. anoplia is like its allies, dioecious. So far only male plants have been observed, but as it produces accessory stems from the base of the main stem it may easily be propagated by division. Its treatment is that of Cape succulents generally. An ample supply of sunlight is, of course, essential for flowering. O.S.

Fig. 1, whole plant (male), nat. size; 2, flower-head with indurated leaf-base above it, $\times 4$; 3, bracts from the base of the flower-head, flattened out, $\times 3$; 4, male flower, surrounded by bracts, $\times 8$; 5, same with the innermost bract (the stamen disjointed) $\times 10$; 6, peripheral bract, $\times 10$; 7, young male flower with the anther still closed, $\times 15$; 8, same, older, with the anther dehiscent, $\times 15$.

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TAB. 8948.

MALUS TORINGOIDES.

West China.

POMACEAE. Tribe SORBEAE.

MALUS, Mill. ; *Koehne, Gatt. d. Pomac.*—*Pyrus Subg. Malus, S. F. Gray ; Benth. & Hook. f., Gen. Plant.* I. 626 ; *Focke in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 22.

Malus toringoides, *Hughes in Kew Bull.* 1920, 205 ; affinis *M. transitoriae*, C. Schneider, sed foliis multo maioribus ad 8 cm. longis minus alte lobatis vel interdum indivisis tandem praeter nervos glabris, floribus fructibusque maioribus nec non calycis lobis acuminato-elongatis distincta.

Frutex vel *arbor* 3-8 m. alta, ramis patentibus subcernuis purpureis vel fuscis praeter novellas araneoso-villosulas glabris. *Folia* magnitudine varia ; lamina 3-8 cm. longa, 1-4.5 cm. lata, ambitu ovata vel elliptico-oblonga, alte lobata lobis plerumque 2 in utroque latere oblongis crenato-serratis (rarius indivisa, lanceolata vel oblongo-lanceolata), viridis, subtus pallidior, adulta ad nervos tantum pubescens, caeterum glabrata ; petiolus gracilis, 1-3 cm. longus, araneoso-villosulus ; stipulae lanceolato-subulatae vel filiformes, petiolo alte adnatae. *Inflorescentiae* umbellatim corymbosae, subsessiles, 3-6-florae ; bracteae lanceolato-lineares, 5-10 mm. longae, mox deciduae ; pedicelli ad 2 cm. longi, laxe villosuli, interdum bracteolati ; bracteolae minutae, filiformes, cito deciduae, ima basi persistente glandulam adumbrante excepta. *Receptaculum* globoso-ellipsoideum, 2-3 mm. longum, uti calyx externus albo-villosulum. *Calycis* tubus late infundibuliformis, 3 mm. altus, intra glaber ; lobi e basi triangulari elongati, acuminati, 2-3.5 mm. longi, intra villosi. *Petala* alba, rotundata, ungue brevi, obtusa, parce crenulata, 9-10 mm. longa, 3-3.5 mm. lata, facie superne pilosula. *Stamina* circiter 20, petalis breviora. *Styli* 3, ad vel ultra medium connati, glabri, stamina superantes. *Fructus* maturus globosus vel obovoideo-globosus, apice depressus, cicatrice annuliformi calycis delapsi notatus, 10-14 mm. diametro, flavus vel in latere ad solem spectante amoene coccineus. *Semina* 7-8 mm. longa, 3 mm. lata. *M. transitoria* var. *toringoides*, Rehder in Sargent, Pl. Wilson, II. 286 ; *Pyrus transitoria* var. *toringoides*, Osborne in Garden 1919, 522 with fig.

A *shrub* or medium-sized *tree* with spreading branches, the longer of which tend to droop more or less, and with an ultimately dull brown, sparsely lenticellate bark ; all the young parts are very finely and whitish woolly, but sooner or later they shed much of their hairy covering. The *leaves* vary much in size, their ovate or elliptic-oblong mostly deeply lobed blades (occasionally they are undivided and lanceolate from a narrow base) are dark-green on the upper and paler on the lower side with some persistent down on the nerves ; the leaf-stalks frequently bear lanceolate awl-shaped or thread-like stipules a few mm. above the base. The *inflorescences* which are borne on short shoots are almost sessile,

umbel-like and 3-6-flowered; their lanceolate-linear bracts fall early as do the frequently present minute bractlets of the flower-stalks which, however, leave their bases or stalklets behind, these mimicking glands. The globose or ellipsoid *receptacle* is like the *calyx* externally woolly as the triangular and often elongated lobes are on their inner face. The *petals* are roundish with a very short claw, of a pure white and minutely hairy upwards on their face. The glabrous *styles* are united up to the middle and exceed the 20 stamens only slightly. The mature *fruits* are globose or almost pear-shaped, measure 10-14 mm. in diameter and are crowned by the annular scar of the fallen calyx, their colour varying from yellow to bright crimson.

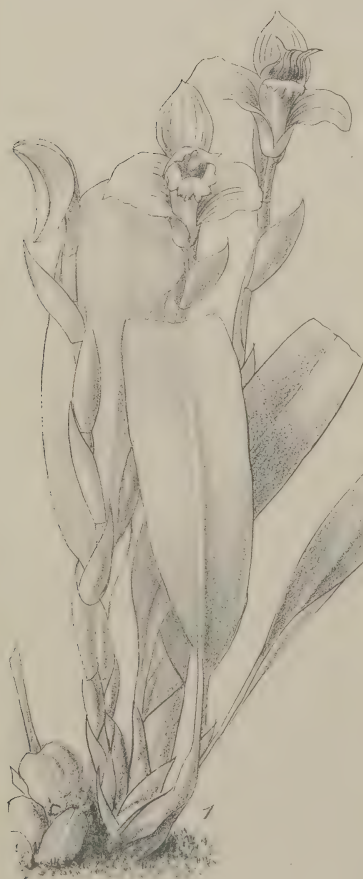
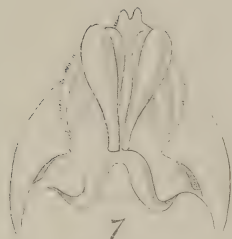
DISTRIBUTION.—West China; Szechuan, in the mountains west of Tachienlu, from 3,000 to 3,600 m., Hosie (a. 1904); Wilson, 3494 (seed no. 1730) and 1285.

M. toringoides is confined to a small area in western Szechuan between Tachien-lu and Batang. The earliest specimens on record date back to 1904 when, in the autumn, General-Consul Hosie and E. Wilson collected them independently in the same tract of country. It was from this collection of Wilson's that Messrs. Veitch & Co. introduced the species into cultivation, and the tree at Kew from which the present figure was prepared has the same origin, having been received from them in 1913. The tree is now about 5 m. high; it flowered and fruited in 1919 when the fruits were drawn, but the flowers were added only last year. Another tree, bearing abundant fruit, so Mr. A. Bruce Jackson informs me, stands in the grounds of the late Mr. Elwes at Colesborne.

It is mainly the brilliantly coloured fruits for which the tree invites cultivation. It has proved quite hardy at Kew as well as at Colesborne, and will be an ornamental addition to any garden where it is likely to enjoy sufficient sunlight to bring the exquisite colouring of its small apples to perfection. O.S.

Fig. 1, a flowering branch, nat. size; 2, a flower, cut lengthwise with the petals and some of the anthers removed, $\times 4$; 3, a petal, $\times 3$; 4, a fruiting branch, nat. size; 5, a cross section through a ripe fruit, $\times 2$.

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TAB. 8949.

MAXILLARIA FLETCHERIANA.

Peru.

ORCHIDACEAE. Tribe MAXILLARIINAE.

MAXILLARIA, Ruiz & Pavon; *Benth. & Hook. f., Gen. Plant.* III. 555; *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6, 187.

Maxillaria Fletcheriana, *Rolfe in Gard. Chron.* LIII. 258 (1913) *et in Kew Bull.* 1914, 213; affinis *M. grandiflorae*, Lindl., sed scapis robustis grandibracteatis, floris colore, mento longe producto, labii forma et papillarum indumento distincta.

Pseudobulbi e rhizomate circiter 6 mm. crasso cataphyllis brunneis arcte obtecto orti, 2·5 mm. distantes, ovoideo-oblongi, subcompressi, 3·5 cm. longi. *Folia* 2 ad pseudobulbi cuiusque basin, 1 ex eius apice ortum; lamina lineari-oblonga, breviter, vel vix acuta, basi in petiolum sensim attenuata, ad 24 cm. longa, 4·5·5 cm. lata, subcoriacea, laete viridis; petiolus ad 5 cm. longus; vagina valde compressa, petiolum aequans vel longior. *Scapi* e basi pseudobulborum orti, 1-flori, robusti, erecti, leviter undulato-flexuosi, 25·35 cm. alti, multi-bracteati; bracteae inferne arcte imbricatae, sursum increscentes, superne earum longitudine distantes, spathiformes, compressae, oblique lanceolatae, summae ad 7 cm. longae, pallide virides vel margines versus lutescentes. *Flores* speciosi; alabastra e latere sublunata, 5·6 cm. longa, cornu superiore crasso. *Mentum* lineare, 3 cm. longum, facie flavescens, tenuiter rubro-striolatum. *Receptaculum* cum pedicello brevi 5·5 cm. longum. *Sepala* alba vel leviter flavido suffusa imprimis basin versus, facie tenuiter purpureo-lineata, summum ovatum, acutum, ad 4·5 cm. longum et 2·5 cm. latum, lateralia similia, sed basi antice longe descendunt et ibi mento adnata. *Petala* oblique ovato-lanceolata, in galeam conniventia, apicibus recurvis, 3·5·4 cm. longa, alba, facie eximie purpureo-lineata. *Labellum* ultra medium mento incumbens et cum eo quasi pharetram referens, superne apertum, explanatum, obovato-oblongum, 4·75 cm. longum, ad 3 cm. latum, papilloso-pruinatum, papillis 1-cellularibus globosis, supra medium callo carnosum et medio orto obovato lato fere 1 cm. longo munitum, supra eum ita plicatum ut 3-lobum esse videatur, lobo intermedio late cordato 1·2 cm. longo 1·8 cm. lato iterum 3-lobulato, lobulis lateralibus crispis, centrali partim ita reflexo ut 4-dentatus fiat, luteum, ad utrumque latus valide purpureo-lineatum vel facie diffuse purpureum, lobis supra aureis. *Columna* crassissima, 1·2 cm. longa, pallida. *Anthera* subglobosa, pallide rubescenti-flava. *Pollinia* per paria inaequalia, clavata, longiora ad 6 mm. longa, aurea.

A densely tufted *herb* of the habit of *M. grandiflora*, but more robust in all its parts and up to 40 cm. high, with ovoid-oblong somewhat compressed pseudo-bulbs each of which produces 2 leaves from the base and 1 from the top. The leaf-blades which are linear-oblong and shortly pointed pass gradually into the petiole and measure up to over 20 cm. by 5·5·5 cm. The 1-flowered scapes rise singly from the bases of the pseudo-bulbs; they are erect, but slightly wavy and about as tall as the

leaves and they bear numerous bracts, imbricate below, but distant by their own length (up to over 6 cm.) higher up; these bracts are much compressed, keeled, lanceolate, sharply pointed and pale green with yellowish or whitish margins. The flower-buds are crescent-shaped with the upper horn stouter and measure just before they open 5.5 cm. from point to point. When completely unfolded, the sepals are creamy white, or the lateral, yellow at the base with fine purple lines on the face; the upper is ovate and acute, measuring 4.5 cm. by 2.5 cm., the lateral are similar, but are produced downwards to join the chin which is 3 cm. long. The petals arch over the column in the form of a helmet; they are white with well marked purple lines, recurved at their tips and 3.5-4 cm. long. The lip is incumbent on the chin for more than half its length, forming with it a laterally open quiver, then opens out and bends forward with a very crisp and somewhat fleshy margin; when flattened out it is obovate-oblong, 4.75 cm. long and 3 cm. wide; on the outside it is yellow with deep red stripes right and left, on the inside it is more diffusely purple with a delicate bloom due to the presence of minute globose papillae, whilst the front is bright yellow; the latter is so folded that it appears 3-lobed, the middle lobe, which is very broad and heart-shaped being slightly lobed again and toothed with the margin reflexed between the teeth; half way down the throat of the quiver rises a fleshy broad obovate callus with a smooth flat surface. The column, anthers and pollinia are about as they are in *M. grandiflora*.

DISTRIBUTION.—Southern Peru, *Forget*.

This is a handsome species with large flowers of a distinctive colouring. The late Mr. Rolfe compared it originally with *M. grandiflora* and *M. Sanderiana*, but subsequently he placed it next to *M. Huebschii*. Its affinity, however, lies clearly with the first species and also, though more remotely, with *M. Lehmannii* and *M. molitor*. It approaches even more closely to a plant collected by Lehmann on the Rio Pastaza below Banos in eastern Ecuador and written up by him as *M. Schroederiana*, and in a later writing, as *M. grandis*, Reichb. f.

Of this plant there is, in the Kew collection, an excellent, partly coloured drawing by Lehmann which differs from *M. Fletcheriana* mainly in the absence of the purple lines on the sepals and in some other, apparently insignificant, details. The name, *M. Schroederiana*, has never been published and need not be considered. *M. grandis*, on the other hand, was described by Reichenbach. The description being of the most meagre, and there being no specimen at Kew, I asked Dr. Zahlbruckner for a tracing of the original in the Reichenbach collection at Vienna, and he supplied me very courteously with a copy of Reichenbach's own sketch and analyses of the plant. From these it is evident that Lehmann's plant from the Rio Pastaza is not the *M. grandis* of Reichenbach. Whether it is only a colour variation of *M. Fletcheriana* it is too early to say. However, as the colour patterns of the maxillaries of the grandiflora-group have so far been found constant in cultivation, it seems more probable that Lehmann's and Forget's plants are slightly differentiated, but genetically fixed members of that group which extends through the Andes from Northern Colombia to near the Bolivian frontier. Messrs. Sanders inform me that the exact locality where Forget collected the plant is not ascertainable, but that it was "in Southern Peru on the borders of Bolivia, or just inside the Bolivian boundary."

The inflorescence which, together with some analyses, is represented in the present plate was kindly communicated by Sir Frederick Moore, when still Keeper of the Royal Botanic Gardens at Glasnevin. He also supplied the photograph from which the habit-figure was drawn. Sir Frederick had the plant from Messrs. Sander & Sons who introduced it originally. They flowered it in their establishment at St. Albans in April, 1913, and exhibited it at one of the Royal Horticultural shows when Mr. Rolfe named it after the Rev. J. C. B. Fletcher of Nundham Vicarage, Chichester, the well-known orchid grower. It is undoubtedly one of the finest species of the genus, quite equal to *M. grandiflora* in the robustness and size of the flowers, but perhaps inferior in colouring as it lacks the exquisitely pure whiteness of the sepals and petals of the latter. At

Glasnevin the plant is being treated as a stove plant and grown at the cool end of the intermediate house in a compost of fibrous peat and sphagnum.

In the differential diagnosis I have referred to the papillae of the lip. These are unicellular and globose in *M. Fletcheriana* giving the surface a "pruinose" appearance, whereas in *M. grandiflora* and other species, especially *M. Lehmannii* and *M. molitor* they are many-celled and form a yellow fur which, by the breaking up of the papillae into cells, is converted into a powdery mass resembling an accumulation of pollen. Janse has studied this phenomenon in *M. Lehmannii* and Porsch in other species of *Maxillaria*, and they have found that the papillae contain abundant starch and act evidently as a bait for insects who, visiting the flowers to feed on the papillae, incidentally effect pollination. This function is apparently in abeyance in *M. Fletcheriana* as the papillae are reduced to a single cell and destitute of starch.

Fig. 1, part of a clump of a flowering plant, $\frac{1}{4}$ nat. size ; 2, flowering scape, nat. size ; 3, flower with petals and sepals removed, nat. size ; 4, lip from above, flattened out, nat. size ; 5, column with anther, nat. size ; 6, anther, $\times 3$; 7, same with the anther-cap removed, showing the pollinia, $\times 3$.

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TAB. 8950.

AMORPHOPHALLUS COFFEATUS.

Rhodesia.

ARACEAE. Tribe AMORPHOPHALLEAE.

AMORPHOPHALLUS, Blume; *Benth. & Hook. f., Gen. Plant.* III. 970; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 3. 126 et in *Pflanzenreich*, IV. 23 c. 61.

Amorphophallus coffeatus, *Stapf* (sp. nov.); affinis *A. Schweinfurthii*, N. E. Brown, sed spadiceis appendice spathae aequilongo crasso et spathae colore distinctus.

Herba tubere discoideo ambitu elliptico, diametris 10 cm. et 7.5 cm. *Folium* solitarium, lamina 3-secta, segmentis 30 cm. longis, lateralibus dichotomis infra et supra dichotomiam uti segmento intermedio pinnatisectis, pinnis inferioribus parvulis, superioribus ad 12 cm. longis, 2.5 cm. latis, omnibus oblique lanceolatis acuminatis margine crispulis; petiolus 45 cm. altus, basi ad 7.5 cm. vaginans. *Pedunculus* basi cataphyllis mox emarcidis cinctus, circiter 15 cm. altus, olivaceo-viridis. *Spatha* 14 cm. longa, basi in tubum 3 cm. longum convoluta, supra late aperta, ovata, 10 cm. lata, breviter caudato-acuminata, margine crispa, dorso luride viridis, facie inferne atro-fusca et ore eximie glaucescens, superne coffeata. *Spadix* spatham subaequans, basi ad 2 cm. nudus; inflorescentia cylindrica, 6 cm. longa, parte superiore ♂ 4 cm. longa, 1.5-1.7 cm. diametro atro-purpurea, parte inferiore ♀ 2 cm. longa pallida; appendix subcylindricus, ad 2 cm. diametro, sublaevis, fere ater, glaucescens. *Flores* ♂: stamina solitaria vel plerumque 2-3-na; filamenta, crassa, magis minusve connata, 3-3.5 mm. longa; antherae 2-loculares, thecis 1 mm. longis lateraliter apertis. *Flores* ♀: pedicellis rudimentariis ad pulvinulos ellipticos redactis insidentes; ovarium late ovoideum, 4 mm. longum, imperfecte 2-loculare vel 1-loculare; stigma sessile, pallide fuscum, alte bifidum, lobis obovoideis. *Ovulum* solitarium, erectum. *Fructus* ignotus.

A tropical *herb* with a tuber of the shape of a depressed disc about 5 cm. thick and concave on the top, which from its centre produces annually, after a prolonged resting period, either a solitary leaf or an inflorescence succeeded by a leaf. The *leaf* is borne on a stout brownish green petiole whose base is formed into a tight sheath, the uniformly fresh green blade is divided into 3 almost equal segments, the lateral of which are forked whilst the intermediate is 3-cleft, all the divisions being pinnately dissected with the pinnae increasing in size upwards and obliquely lanceolate with decurrent wedge-shaped bases and acuminate or tailed tips. The *flowering spathe* rises on a stout stalk of about equal length; it is contracted at the base into a short tightly closed tube and is widely open above it, has a crisped edge and ends

in a shortly tailed tip; more or less dull green on the back, it is of a rich coffee-colour on the face with a strong bluish bloom towards the tube. The very stout cylindric *spadix* or *flower-spike* equals the spathe in length; it is barren, smooth and almost black in the upper half, whilst the lower fertile half is male in the exerted upper two-thirds and female in the lower third, the female portion being slightly wider than the male, quite enclosed in the tube and very pale brown. The *male flowers* are closely packed and reduced to 2 or 3 stamens with their filaments more or less fused and their anthers opening by lateral pores. The *female flowers* are more loosely arranged and seated on elliptic cushions in the centre of spirally arranged lozenge-shaped areoles, vertically separated by wavy ridges, and they consist each of a pistil only. The *ovary* is imperfectly 2-celled with a single basal ovule and crowned by a deeply 2-cleft sessile stigma. The *fruit* is unknown.

DISTRIBUTION.—Rhodesia; Salisbury Division, in shady moist places near Traveller's Rest Farm, 1,100-1,200 m., *T. Wylde*.

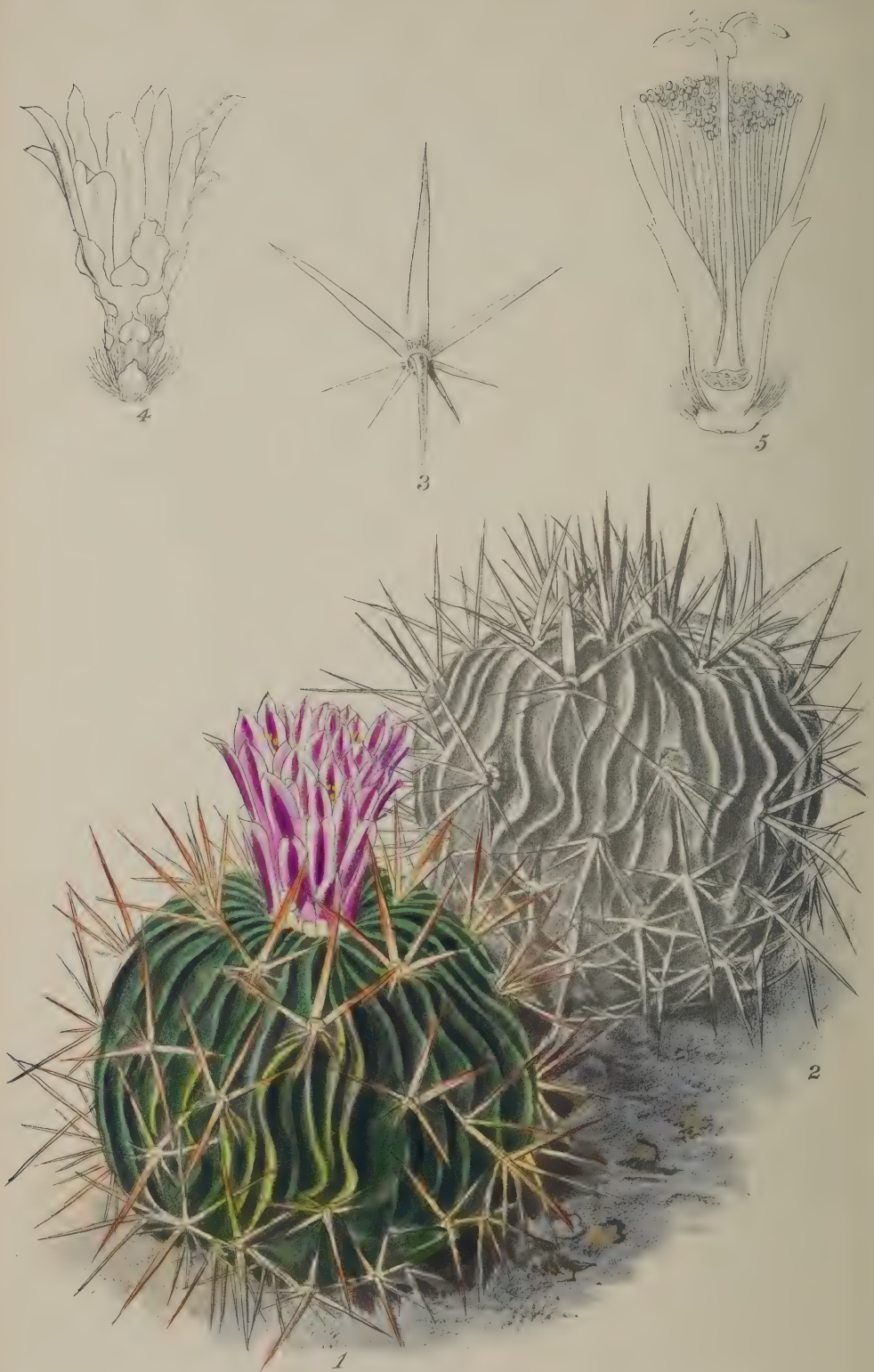
The plant depicted in this plate was raised from a tuber communicated to the Royal Botanical Gardens, Kew, by Mr. Thos. Wylde of Putney, in 1920. He obtained it, so he informs me, at the Traveller's Rest Farm in the neighbourhood of Bindura, Southern Rhodesia, about 112 kilom. (85 miles) north of Salisbury. It grows there "in a shady place and requires moist ground which does not get quite dry in the season from May to the middle of October and flowers in January." At Kew it flowered in February, the interval between the opening of the spathe and its collapse being about eight days. During that time the inflorescence emitted an unpleasant odour which was particularly offensive the first two or three days. The leaf appeared some weeks later, but developed very slowly and was not fully unfolded until August. The plant was grown with other species of *Amorphophallus* in a warm range with a minimum temperature of 15-16 C. (60 F.). When, after the decay of the leaf, at the end of September, the tuber was lifted, it showed in the centre the base of the peduncle,

surrounded by the scars of the leaf and of the cataphylls, and four or five green bosses in their axils, evidently young leaf-buds, whilst laterally from below the middle an ascending sucker sprang, over 8 cm. long and 1 cm. thick. It was white and bore at intervals the delicately membranous remains of cataphylls and it terminated with a bud of short fleshy tightly imbricate scales with the tips of roots emerging from between them. Below the tuber and still attached to it was the mother-tuber, reduced to a pulpy mass within a skinny bag. The formation of suckers on the tubers of aroids is apparently very rare. Mr. Taylor who is in charge of the Tropical Department at Kew tells me that he remembers only one other instance, namely *Amorphophallus Kerrii*. In that case the tip of the sucker thickened and eventually grew into a tuber similar to the one from which the tuber had sprung. Normally, however, the young tuber of this species also forms directly on the old.

A. coffeatus has been compared above with *A. Schweinfurthii* which has much in common with it. This species is widely distributed throughout tropical Africa, from the Cameroons to Western Abyssinia and southwards to Massai land, inhabiting forests as well as the bush of the steppes. Both are typical members of the section *Hydrosme*, one of the more natural groups of *Amorphophallus*, a genus which, as Engler has pointed out, includes not a few heterogeneous elements. *Hydrosme* is confined to tropical Africa and comprises, in the sense of the Pflanzenreich, 11 species. O.S.

Fig. 1, a whole plant, about 1/7 nat. size; 2, a pinna of a leaf, nat. size; 3, an inflorescence, nat. size; 4, the spadix of the same, nat. size; 5, two male flowers, $\times 6$; 6, two female flowers, whole and in longitudinal section, $\times 6$; 7, surface of a part of the female portion of an inflorescence after the removal of the flowers, showing the cushions (rudimentary pedicels) on which the flowers were seated, $\times 5$.

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ECHINOCACTUS UNDULATUS.

Mexico.

CACTACEAE. Tribe ECHINOCACTEAE.

ECHINOCACTUS, Link & Otto; *Benth. & Hook. f., Gen. Plant.* I. 848; *K. Schum. in Engl. & Prantl, Nat. Pflanzenf.* III. 6a, 185.

Echinocactus undulatus, *Dietr. in Allg. Gartenzeit.* XII. 187 (1844); arcte affinis *E. arringenti*, Link ex Dietr., sed aculeorum fasciculis in costis plerumque singulis, aculeis paucioribus (7-8) longioribus (ad 20-25 mm.), floribus circiter 3.5 cm. longis distinctus.

Caulis subglobosus, 6 cm. diametro, vertice leviter depresso, atro-viridis, vix glaucescens, multicostatus, valide armatus; costae 30-60, subverticales, leviter undulatae, compressae, 6-9 mm. altae, 3-mm. crassae vel ad pulvinulos ad 5 mm. dilatatae; sulci obtusi. *Pulvinuli* in costis plerumque singuli, primo orbiculares et dense albo-villosi, mox sursum elongati et calvescentes, tandem 6-7 mm. longi et subglabri. *Aculei* 7-8-ni, interdum pauciores, heteromorphi; 4 inferiores per paria oblique descendentes, aciculiformes, tenues, 7-10 mm. longi, albi, 3 superiores robustiores, cornei, basi pallidi, superne brunnescentes, apice saepe rubro-brunnei, inaequales, nempe laterales subteretes, 15-20 mm. longi, intermedius magis minusve applanatus, 18-20 mm. longus et ad 2 mm. latus, centralis si adest horizontalis vel leviter curvatus, 20-25 mm. longus, subteres. *Flores* pauci in caulis vertice congesti, aperti obconici, 3.5 cm. longi, ore 2 cm. diametro. *Receptaculum* basi annulo villosio circumdatum, circumcirca in tubum ad 12 mm. altum productum. *Sepala* late ovata, acuta vel apiculata, inferiora albida et 4-5 mm. longa lataque, summa elliptico-oblonga; alba, ad nervum medium violacea, ad 8 mm. longa, sensim in petala abeuntia. *Petala* anguste oblonga, acuta vel apiculata, exteriora ad 16 mm. longa, interiora ad 24 mm. longa, 2.5 mm. lata, sub anthesi apice paulo recurva, pallide rosea, insigniter violaceo-vel fusco-purpureo-vittata. *Stamina* petalis multo breviora; filamenta 1 cm. longa; antherae pallidae. *Stylus* stamina superans; stigmata 8, patula, recurva. *Fructus* ignotus.—Foerster, *Handb. Cact.* 309 (1846), ed. II. 539 (1885); Labourd. *Mon. Cact.* 217 (1853); Hemsley in *Biol. Centr. Am. Bot.* I. 539 (1888); Britten & Rose, *Cact.* III. 117 (1922) sub *Echinofossulocacto crispato*. *E. crispatus*, Zucc. *Plant. nov. v. minus cogn.* III. *Cact.* 612, 727 (1837); Lemaire in *Allg. Gartenzeit.* VIII. 229 (1840); Foerster, l.c. 312 (1846); Hemsley, l.c. 530 (1888); Nichols. *Dict. Gard.* I. 499, f. 688 (1885); Watson, *Cact. Cult.* ed. I. 99, f. 33 (1890); Schum. *Gesammtbeschr. Kakt.* 371 (1899); Schelle, *Handb. Kakt.* 172, f. 102 (1907); non DC. *E. multicostatus*, Saff. in *Ann. Rep. Smithson. Inst.* 1908, 351, t. 4, f. 3, non Hildm.

Stem almost globose, about 6 cm. high and almost as wide, slightly depressed at the top, dark dull green, with many more or less vertically descending and wavy ribs which are much compressed, 6-9 mm. high and 3 mm. thick, except at the spine-cushions where they are widened; ribs 30-60. The *spine clusters* stand normally one on each rib and spring from small densely

villous cushions which, when young, are round, but become soon elongated upwards and lose their hairy covering. There are usually 6 or 7 radially arranged *spines* in a cluster and a central spine standing out horizontally or curved downward; the 4 lower radial spines resemble fine white fish-bones and are 7–10 mm. long, whilst the upper 3 are about twice as long, much stouter and brownish from a pale base, the intermediate spine being moreover flat and up to 2 mm. wide; the central spine, if present, is the longest, but resembles otherwise the lateral upper spines. The sessile *flowers* rise in groups of 3 from the top of the stem in close proximity; they are funnel-shaped, 3.5 cm. long and measure 2 cm. across their mouth when fully open; The *receptacle* is inserted on a villous ring, whose soft white hairs surround the carpel-bearing portion, and it is raised above it as a fleshy funnel-shaped tube. The *sepals* are loosely disposed, very broadly ovate to elliptic-oblong (the uppermost) and finely pointed; they increase in size upwards and pass into the petals; the lowest are whitish to pale brown, the following more or less violet with pale broad margins. The *petals* are narrowly oblong with pointed and slightly recurved tips and the innermost, of which there are about 10, are about 24 mm. long and 2.5–4 mm. wide; they are white or pale rose with a broad violet-purple or brownish-purple band along the mid-nerve. The *stamens* exceed slightly the tubular portion of the flower and are themselves exceeded by the *style* with its 8-rayed pale yellow stigma.

DISTRIBUTION.—Mexico (see below).

In 1829, A. P. DeCandolle described and figured in his *Revue des Cactées*, 37, t. 8, a cactus under the name *Echinocactus crispatus*. This species was based entirely on a drawing in Mocino and Sessé's Mexican collection. The drawing has since been lost and there is no dried specimen of the plant extant, nor is the locality known where it was observed. DeCandolle's figure which, for diagnostic purposes is somewhat crude, shows a slightly elongated body with about 20 ribs, with the spine-clusters mostly on the ribs, but partly also in the grooves, the spines short and brown, the flowers about

2.5 cm. long, with a long narrow tube, almost imbricate sepals and uniformly purple or white-edged petals which spread star-fashion. About the same time cactuses began to be imported into Europe from the mining districts of the Mexican State of Hidalgo, particularly through W. F. von Karwinski, a Bavarian naturalist, who stayed in Mexico from 1827-1832. Martius named several of them in the plant list of the Botanic Garden at Munich for 1829, L. Pfeiffer and Zuccarini adding descriptions later on. Among these new introductions was one identified by Zuccarini (1837) with DeCandolle's *E. crispatus*. It had been collected by Karwinski near Pachucha in Hidalgo. Zuccarini described it; but his description excludes DeCandolle's *E. crispatus* whilst it suggests strongly that it was specifically identical with the cactus figured here. However that may be, the concept of the latter as the genuine *E. crispatus* became soon an established tradition in gardens which has prevailed to this day. Zuccarini also gave a description of the *E. dichroacanthus*, found by Karwinski at Zimapan, about 100 kil. to the north-west of Pachuca, and proposed by Martius as a new species in 1829. It recalls very much the main features of his "*E. crispatus*" and it may have been only a form of it. However, the plant was lost early and cannot, so Dr. Kupper, Curator of the Botanic Garden at Munich, informs me, be traced in the Herbarium there, so that exact identification is impossible. Soon after Karwinski's return another German, Karl Ehrenberg, resumed the botanical exploration of Hidalgo and he too imported numerous plants into Europe. His connections were mainly with Berlin and many of his novelties were described in the Allgemeine Gartenzeitung. As he went over the same ground as Karwinski it is not surprising that he was forestalled by his predecessor with regard to some of his discoveries. Of these *E. undulatus*, described by F. G. Dietrich in 1844, is an instance. It is generally recognised as synonymous with the *E. crispatus* of gardens and, the latter being misnamed, *E. undulatus* will have to be restored as the valid name of the species.

E. undulatus seems to have a wide distribution in Mexico. Karwinski found it growing in the rich soil of

the savanna of Pachuco at 1500–1800 m. and, if *E. dichroacanthus* is actually synonymous, at Zimapan. Dr. Hans Gadow collected it in Southern Michoacan at 900 m. and, in 1909, communicated a living specimen through Sir Reginald Tower, then British Minister in Mexico, to Kew, where it is still growing, but has not yet flowered. Further, I am inclined to refer to it also the photograph of a plant reproduced by Safford in the Annual Report of the Smithsonian Institute for 1908 (t. 4. f. 3) under the name of *E. multicostatus* which, if my surmise is correct, would prove a northward extension of the area to about 26° N. Lat. (N.W. of Monterey, Nuevo Leon).

The present plate has been prepared from a specimen in the possession of the late Mr. Elwes, and since transferred to Kew, where it is grown in the succulent pit with other cactuses and euphorbias. After flowering last April it produced an ample crop of new spine-clusters from the top as shown in fig. 2. In Dr. Gadow's specimen, however, the apical spine-clusters are quite small, the plant resembling altogether Safford's picture except for the number of ribs which is, as in Elwes' specimen, 34. *E. undulatus* seems to be a shy flowerer.

Britton and Rose in their magnificent monograph of the *Cactaceæ* of North America have recently revived Lawrence's genus *Echinofossulocactus* (1841) for the group to which *E. undulatus* belongs. The uncouth name was evidently meant to refer to the channel (*fossula*)-like upward extension of the depression in which the spine-cushion is situated. It is to me still an open question how far the splitting up of the genera of *Cactaceæ* proposed by Britton and Rose is justified on material and practical grounds. Therefore, and because I myself have not had the time to form an independent view on the subject, I have refrained in this place from making the corresponding new combination. O.S.

Fig. 1, flowering plant, nat. size ; 2, the same plant six months later, nat. size ; 3, a spine-cluster, $\times 1.5$; 4, a flower, very slightly enlarged ; 5, a longitudinal section through the lower half of the flower, somewhat diagrammatic, $\times 2$.

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DRACOCEPHALUM ISABELLAE.

South-west China.

LABIATAE. Tribe NEPETEAE.

DRACOCEPHALUM, Linn., *Benth. & Hook. f., Gen. Plant.* II. 1199; *Briquet in Engl. & Prantl, Nat. Pflanzenf.* II. 1204.

Dracocephalum Isabellae, *Forrest in Not. Bot. Gard. Edinburgh*, VIII, 211 (1911); affine *D. tangutico*, Max., et *D. Forrestii*, W. W. Smith, sed inflorescentiae indumento lanato-villoso, corollae tubo e calyce vix vel breviter exserto supra medium abrupte ampliato, nuculis cristatis, ab illo praeterea foliis 5-7-sectis fere digitatis dorso praeter costam epilosis distinctum.

Herba perennis, multicaulis, 30-50 cm. alta, caulibus tota longitudine breviter ramosis ad angulos lanato-villosis, ramis tenuibus, intermediis et superioribus folia subtendentia paulo superantibus. *Folia* sessilia vel subsessilia, fere ad basin digitatim 5-7-secta, ambitu rotundata vel rotundato-ovata; segmenta linearia, obtusa vel subobtusa, 1.5-2 cm. longa, 2-3 mm. lata vel ea ramulorum breviora et multo angustiora, firmula, facie atro-viridia et sparse minute hispidula, dorso pallidiora et praeter costam pilosulam glabra, glandulis vero laxè conspersa, margine revoluta hirsutiusculo. *Inflorescentia* spiciformis, densa, 8-10 cm. longa, verticillastris inferioribus distinctis foliis caulinis similibus suffultis, caeteris dense approximatis conspicue bracteatis; bractae ambitu ovato-cuneatae, ad 2.5 cm. longae, ad vel ultra medium 3-fidae segmentis lanceolatis aristulatis vel intimae summaeque lineari-lanceolatae, dorso atro-purpureae, facie parce pilosulae, ad margines lanato-villosae; pedicelli tenues, ad 5 mm. longi, villosuli, *Calyx* magis minusve curvatus, tubulosus; tubus sursum sensim ampliatus, ore obliquo, subaequaliter dentatus, 1.2-1.5 cm. longus, extra undique albo-villosus, intra laxè pilosus, dentibus triangularibus aristulatis ad margines lanatis. *Corolla* breviter exserta, parte exserta pulcherrime violacea et extra purpureo-lanata; tubus curvatus, ad vel ultra medium angustus et extra laxè vel vix pilosulus, deinde subabrupte ampliatus et lanatus, 1.5-2 cm. longus, intra postice tota longitudine, antice saltem basin versus pilosulus; labium superum fornicatum, expansum ellipticum, integrum, obtusum, circiter 1 cm. longum; labium inferum porrectum, 2 cm. longum e faucibus latis 3-lobum, lobis lateralibus brevibus rotundatis, intermedio reniformi alte emarginato ad latera crispo denticulato glaberrimo. *Stamina* sub labio supero ascendentia: filamenta ad 1 cm. longa, inferne pilosula vel postica tota glabra; antherae approximatae, fere atrae, posticae paulo supra anticas positae, glabrae. *Stigma* bifidum, e labio supero breviter exsertum. *Discus* tenuiter annularis, antice in glandulam ovoidem nuculas interdum subaequantem ampliatus. *Nuculae* maturae oblongae, apice late cristatae, crista denticulata inclusa 5.5 mm. longae, fuscae.

A tufted perennial herb, 30-50 cm. high, with more or less erect 4-angled stems woolly at the angles, and with short barren slender branchlets from the axils of the leaves. These are indistinctly stalked, almost digitate with 5 or 7 linear segments connected at the base only, dark green and slightly rough on the face and sparingly

glandular on the back ; the hairy margins are recurved, or, particularly in the leaves of the barren branches, tightly revolute when the segments appear very narrow. The deep-violet *flowers* are gathered into dense rather short and woolly false spikes whose lower cymes are supported by leaves of the same type as those of the stem, whilst higher up and on all the secondary branchlets 3-cleft externally dark brownish-purple bracts take their place, covering the short pedicels and the bases of the *calyces*. The latter are curved, rather widely tubular with an oblique mouth and 5 nearly equal, triangular and almost prickly teeth. The *corolla* is shortly exserted from the calyx, its tube exceeding the latter only by a few mm. The corolla-tube is curved, very slender and sparingly hairy up to the middle, above which it widens abruptly and becomes densely and softly hairy. This woolly covering continues over the backs of the upper lip and of the greater part of the lower lip and is more or less purple. The upper lip is vaulted, blunt and entire and about half as long as the lower lip, which at the base forms a wide concave throat and then becomes 3-lobed, the large kidney-shaped concave and deeply notched middle lobe standing athwart the short round side-lobes. The whole flower measures up to 3 cm. The *anthers* are glabrous and almost black and are placed in superposed pairs under the vault of the upper lip, which is slightly exceeded by the bifid style ; the anther-cells spread at a straight angle. A conspicuous *disc-gland* rises in front of the cluster of nutlets. The mature *nutlets* are oblong with a broad toothed crest at the top, dark brown and about 5.5 mm. long.

DISTRIBUTION.—South-west China, Yunnan ; North-west Yunnan, Chungtien Plateau (27° 30' N. Lat.), *Forrest*, 12789.

Dracocephalum Isabellae was named so by its author after his sister, Miss Isabel Forrest. It is one of the many charming contributions which botany and horticulture have received during the last twenty years from that inexhaustible botanical paradise, western Yunnan. It occurs there "in open stony limy pastures" on the Chungtien Plateau at an altitude of 3,600 m. The

same plateau is the home of *D. Forrestii* to which I have referred in the differential diagnosis and which has also been found on the neighbouring Lichiang range at a slightly lower level. Both species have much in common in the shape and structure of the calyx and the cut of the leaves, characters in which they approach two other Yunnan dracocephalums, also discoveries of Mr. Forrest, namely *D. propinquum* and *D. taliense* and further *D. tanguticum*, a native of Tibet (from Mt. Everest to Kansu) and of West Szechuan, and a plant, not unknown in gardens. *D. Isabellae*, the showiest of them, is, however, easily recognised by the rich violet of the rather large-limbed, though short, flowers, the rich colouring of the bracts and calyces and the general velvety wooliness of the inflorescence in which the white marginal fringes of the bracts and calyx-teeth contrast pleasantly with the purple of the rest of the hairs. The foliage also recalls *D. austriacum*, an old garden plant, but the shape of the calyx-teeth and the hairy anthers of that species do not suggest a close affinity with the Chinese group. In fact, the latter seems to represent a small independent phylum within the section *Moldavica* of *Dracocephalum*, inclining in the structure of the calyx to certain species of *Nepeta*, e.g., *N. Hemsleyana*, a native of Southern Tibet.

It is well known that not a few *Labiatae* exhibit a marked sexual heteromorphism which apart from the sexual organs finds expression most generally in the size and, to a lesser degree, the shape of the corolla. *Salvia pratensis* is a familiar instance. P. Knuth and A. Schulz have also recorded it in *D. austriacum*, *D. Moldavica* and *D. Ruyschianum*, species which bear, on different individuals, either protandrous hermaphrodite or functionally female flowers. A similar gynodioecism may be observed in *D. tanguticum*, where (1) small hermaphrodite flowers, apparently the common form and the one from which the species was originally described, (2) large hermaphrodite flowers (Tachienlu, *Wilson*, 579 p.p.) and (3) small female flowers (Lhasa, *Walton*) occur. Whether *D. Isabellae*, however, behaves in a similar way is still uncertain. The flowers of the plant depicted here were hermaphrodite with an abundance

of pollen in their well-formed anthers and with well developed pistils.

The plant which is portrayed in the present plate was communicated to the Editor by Professor W. W. Smith of the Royal Botanic Garden at Edinburgh who, in connection with Mr. Forrest, made the group to which it belongs the subject of a paper in the Transactions of the Botanical Society of Edinburgh (Vol. XXVII, 89-93). As might be expected *D. Isabellae* is quite hardy in this country and should succeed in any garden in open situations and in dry calcareous soil. It flowers at Edinburgh in early summer and is usually fruiting before *D. Forrestii* flowers, which it commonly does there in September.

O.S.

Fig. 1, flowering stem, nat. size ; 2, bract, nat. size ; 3, flower $\times 2$; 4, calyx, cut open and flattened out, seen from the inner side, $\times 2$; 5, posterior half of corolla $\times 2$; 6, anterior half of corolla, $\times 2$; 7, pistil, $\times 2.5$; 8, frontal disc-gland and young nutlets, $\times 3$.

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TAB. 8953.

RHODODENDRON PLANETUM.

China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1, 35.

Rhododendron planetum, Balf. f., in *Not. Bot. Gard. Edinb.* XII. 145 (1920); affine *R. sutchuenensi*, Franch., et *R. calophyto*, Franch., sed corollae tubo late infundibuliformi, limbi lobis 6-7 aequalibus facile distinctu.

Frutex in hortis ad 3 m. altus; rami crassi, annotini primo floccoso-pilosi, mox glabrati, virides. *Gemmae* oblongo-ovoideae, fere 2 cm. longae, squamis extimis rotundatis apiculatis, caeteris ex ovato ad oblongo-ovatum transeuntibus sparse ciliatis magis minusve sericeo-pubescentibus. *Folia* petiolata; lamina elongato-oblonga, breviter acuta, basi leviter angustata, ad 20 cm. longa et 6 cm. lata, coriacea, facie atro-viridia, glabra, dorso pallidior, ad costam nec non hincinde ad nervos venasque tenuissime floccoso-pilosa, mox glabrata, costa dorso crassa prominente, nervis lateralibus utrinque 15-20 obliquis; petiolus crassus, mox glabratus. *Inflorescentia* umbelliformis, sessilis, ad 10-flora; gemma crassa, ovoidea, ad 3 cm. longa; bracteae exteriores magis minusve rotundatae, tenuissime pubescentes, interiores elongatae; intimae spatulato-oblongae, apiculatae, ad 3.5 cm. longae, dorso sericeae; bracteolae lineari-filiformes, villosociliatae vel superne subplumosae; pedicelli 1.5 cm. longi, glandulosi. *Calyx* ad annulum 5-dentatum 1 mm. altum redactus. *Corolla* subregularis, 5-5.5 cm. longa, undique glabra; tubus late infundibuliformis, basi inter petalorum commissuras leviter gibbosus et secundum eas carmineo-suffusus, caeterum roseus, plerumque emaculatus; limbus lobis 6-7 aequalibus vel subaequalibus rotundatis emarginatis ad 1.5 cm. longis ad 2 cm. latis roseo-albidis. *Stamina* 12-14, longiora 3 cm. longa; filamenta basi paulo dilatata et minute glanduloso-puberula; antherae atro-purpureae. *Discus* viridis, glaber. *Ovarium* breviter digitaliforme, glaberrimum, pallide roseo-suffusum; stylus glaber, basi purpurascens, sub stigmate late discoideo lobulato paulo incrassatus. *Capsula* oblongo-cylindrica, ad 3 cm. longa, 1 cm. lata, valvis 4-5 crassis subsulcatis. *Semina* anguste oblonga, ala angusta inclusa 3 mm. longa.

An erect *shrub* of tree-like habit with stout branches, green in the first year with a fluffy white down which, however, disappears soon. The *foliage-buds* are egg-shaped, green and, upwards, purplish with the inner scales finely silky on the sides. The *leaves* are stalked, their blades elongated-oblong from a slightly narrowed base and shortly pointed; they measure 20 cm. by 6 cm. and are leathery, dark green on the face and paler on the back, and when full grown glabrous with the exception of the remains of some fine fluffy down, particularly on the back along the stout mid-rib, the down consisting

of much-branched hairs with very thin-walled, somewhat bladdery cells; the leaf-stalk is very stout and glabrous. The *inflorescence* is umbel-shaped, about 10-flowered and sessile; it is produced from a large egg-shaped bud with numerous bracts which pass from a rounded to a spatulate or oblong shape and are leathery with a fine down (the outer), or papery and silky (the inner), whilst the bractlets at the base of the flower-stalks are very narrow and softly ciliate or feathery upwards; the flower-stalks are glandular and up to 1.5 cm. long. The *calyx* is reduced to a circlet with 5 small teeth. The glabrous *corolla* is pale-rose with or without a dorsal crimson blotch at the base, darker along the lines indicating the union of the petals and very pale in the limb; it is about 5.5-5 cm. long; the tube is widely funnel-shaped, the limb 6-7-cleft with slightly notched, round and almost equal lobes. The *stamens* number 12-14, the longest being about 3 cm. long; the filaments are slightly widened at the base and minutely glandular-hairy, the anthers purplish-black. The perfectly glabrous *ovary* is thimble-shaped, faintly fluted and has a green disc at the base; the style is glabrous and slightly purplish at the base and its large knob-shaped stigma exceeds much the stamens. The *capsules* are almost cylindric with mostly 5 slightly fluted valves.

DISTRIBUTION.—China; probably western Szechuan, *Wilson*.

The name "*planetum*" was intended to allude to the "appearance (of the plant) in cultivation as a rogue." It was picked out by Mr. J. C. Williams from a bed of rhododendrons at Coombe Wood in 1912, and brought to flower in his garden at Caerhays Castle in 1919. The bed was numbered 1882 (*Wilson* exc. 1903), but as Mr. *Wilson*'s field note under that number refers to a rhododendron with "ovate-cordate" leaves, the origin of the plant must remain uncertain beyond the general statement that Mr. *Wilson* collected the seed in China and apparently in the neighbourhood of Tachienlu. Its affinity lies clearly with *R. sutchuenense* and *R. calophytum*, although the shape and the lobing of the corolla

also challenge comparison with *R. decorum* and its immediate allies and might even suggest hybrid-origin with one of them as a parent; but, to my mind, this is not probable and at any rate entirely hypothetical. However that may be *R. planetum* will always recommend itself to the gardener by the beauty of its flowers and its rapid growth, and as it seeds freely it may be expected to establish itself in the milder parts of this country. Mr. J. C. Williams to whom we owe its contribution to the Botanical Magazine says that it succeeds well in cool positions, and as it flowers later than *R. sutchuenense*, it may escape the injuries from early frosts to which the flowers of that species are exposed. O.S.

Fig. 1, flowering branch, nat. size; 2, base of a leaf, back view, nat. size; 3, intermediate bract, nat. size; 4, bracteole from the base of a flower-stalk, nat. size; 5 and 6, filament-bases and anthers, $\times 4$; 7, pistil, $\times 2$.

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TAB. 8954.

CIRRHOPETALUM TRIPUDIANS.

Burma and Siam.

ORCHIDACEAE. Tribe EPIDENDREAE.

CIRRHOPETALUM, Lindl.; *Benth. et Hook. f., Gen. Plant.* III. 504; *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 178.

Cirrhopetalum tripudians, *Parish et Reichenb. f. in Gard. Chron.* V. 816 (1876); affine *C. refracto*, Hook. f., *Fl. Brit. Ind.* v. 779 (non Zoll.), sed floribus magis approximatis, sepalo postico multo brevioris haud longe sensim setaceo-acuminato nec roseo-purpureo et labii forma distinctum; etiam cum *C. Wallichii* comparatum inflorescentia vero haud umbelliformi ab eo distat.

Pseudobulbi depressi, e medio breviter conici, circiter 2-2.5 cm. diametro. *Folia* 2-na, ante anthesin decidua lanceolato-oblonga, acuta vel subacuta, ad 8 cm. longa et 2 cm. lata, viridia, firmula. *Scapus* lateraliter e basi pseudobulbi ortus, gracilis, circiter 15 cm. longus, apice curvatus et saepe cernuus, squamis 3 distantibus scapo arcte adpressis basi vaginantibus acute acuminatis tenuiter scariosis. *Inflorescentia* patula vel pendula, densiuscula, spiciformis, 2.5-4.5 cm. longa, 8-12-flora; bracteae ovatae, acute acuminatae, circiter 6 mm. longae, membranaceae, albae, deciduae. *Flores* brevissime pedicellati, 2-4 mm. distantes. *Receptaculum* turbinatum, subsulcatum, 1.5 mm. longum. *Sepalum* posticum ovatum, abrupte breviter vel longiuscule et tunc setaceo-acuminatum, 4 mm. longum, margine minute fimbriatum, facie pilosulum, extra flavum vel superne aureum et carmineum suffusum, intra praeter marginem aureum pilis inclusis carmineum; lateralialia lorata, basi per 4 mm. libera et ita excisa ut fenestra fiat, abhinc ad apicem cohaerentia, aurantiaca, minute purpureo-punctata, 3-4 cm. longa, conjunctim 6-7 mm. lata. *Mentum* breve, antice 2-tuberculatum. *Petala* triangularia, acuminata, 2-2.5 mm. longa, caeterum sepalo postico similia. *Labellum* carnosum, subpanduriforme, basi vix contractum, 2.5-3 mm. longum, facie antice gibbo atro-violaceo in carinam basin versus producto instructum, caeterum pallide violascens vel purpurescens et in facie violaceo-punctatum, sursum violaceo-pilosum pilis saepe fasciculatis. *Columna* brevis, pallida, 2-cornuta, cornibus antrorsum curvatis. *Anthera* albida, in dorso papillosula. *Pollinia* per paria valde inaequalia. *C. refractum*, Hook. f., *Fl. Brit. India* V. 779 (1890); King in *Ann. Bot. Gard. Calcutta*, V. 18 (1895) in part, and VIII. 87 (1898) in part; non Zollinger. *Bulbophyllum tripudians*, Parish & Reichenb. f. in *Trans. Linn. Soc.* XXX. 154 (1874).

The leaves of this species are after flowering produced in pairs from the short conical tops of the loosely clustered depressed pseudo-bulbs; they are lanceolate-oblong and more or less pointed and measure up to 8 cm. by 2 cm. The slender flowering scape springs laterally from the base of the pseudo-bulb, rises up to 15 cm. and is then sharply recurved so that the inflorescence becomes nodding; it bears 3 tightly appressed membranous finely pointed scales. The inflorescence is about 2.5-4.5 c.m. long, spike-like and rather dense, the

correctly spelt would mean "yellow petal" from κίττος =pale yellow; but it is more probable that the author meant to refer to the long strap-shaped lateral sepals which are the most salient feature of the genus, and in some of the species, would justify an allusion to the locks or curls of a human head, in which case the proper spelling would be *Cirropetalum* from cirrus—a curl.

At Glasnevin the plant is grown in the intermediate house in a small orchid-pan suspended from the roof, the usual compost of fibre and sphagnum being used.

Fig. 1, pseudo-bulb with flowering scape, nat. size; 2, pseudo-bulbs with leaves, nat. size; 3, a flower with the lateral sepals removed, $\times 8$; 4, a portion of a flower from above, with the upper sepal and the petals seen over the "window," $\times 8$; 5, lip, flattened out in back-view, $\times 14$; 6, the same in face-view, $\times 14$; 7, anther, $\times 24$; 8, pollinia, $\times 11$.

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LACHENALIA CONVALLARIODORA.

South Africa.

LILIACEAE. Tribe SCILLEAE.

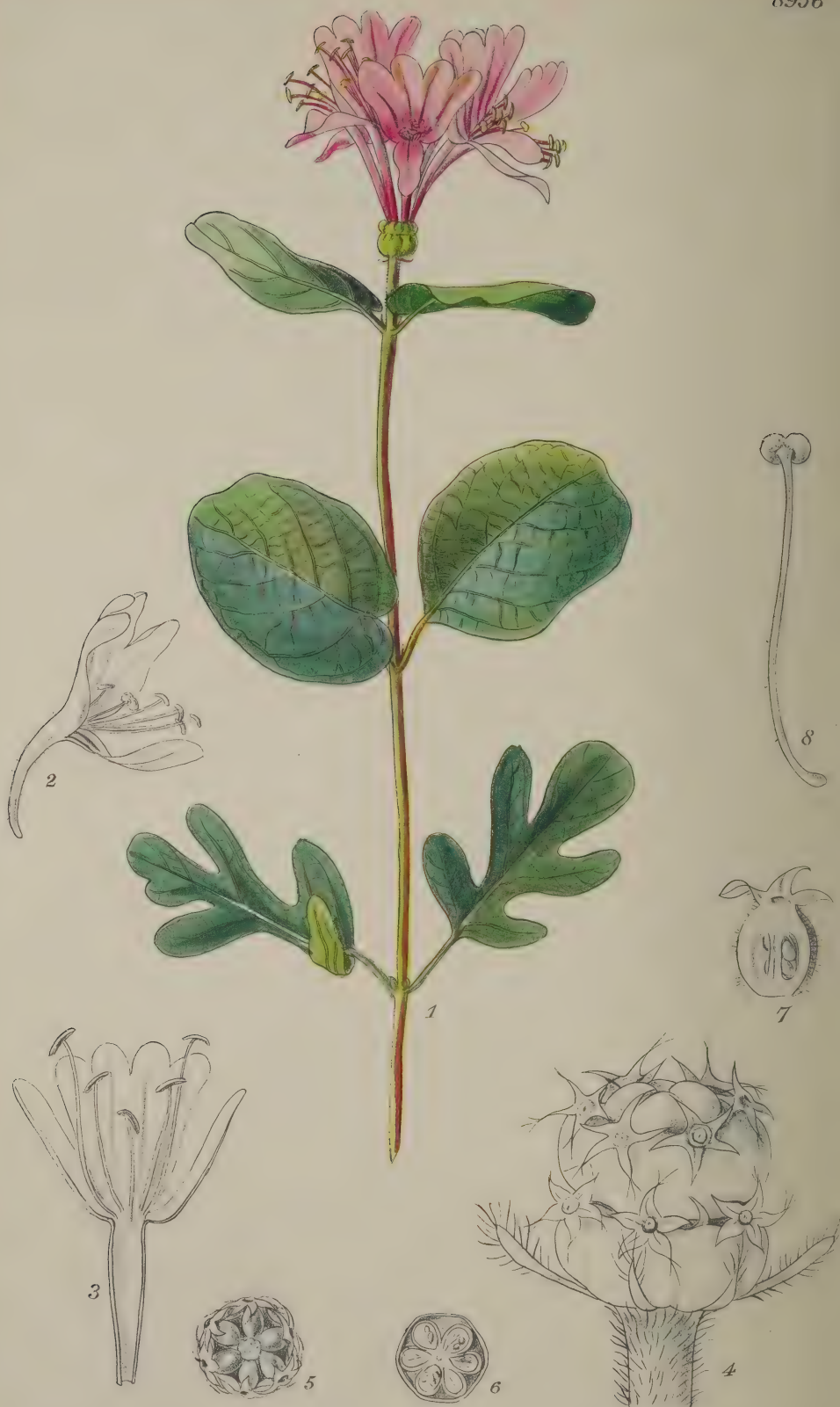
LACHENALIA, Jacq.; *Benth. & Hook. f., Gen. Plant.* III. 820; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 63.

Lachenalia convallariodora, Stapf (sp. nov.); ex affinitate *L. orchoidis*, Jacq., sed bulbis 7–10 mm. dimetientibus 3–8-nis, foliis angustis sursum attenuatis, floribus 2·5 cm. raro excedentibus praeter segmenta interiora limbo lilacino gaudentia fere albis distincta.

Herba bulbosa, 15–25 cm. alta, glaberrima. *Bulbi* subglobosi, 7–10 mm. diametro, 3–6-ni. *Folia* 2-na cum quoque scapo, lanceolato-lorata, utrinque attenuata, apice recurva, ad 16 cm. longa, 1–1·75 cm. lata, viridia nisi sursum atrobubentia, haud vel obscure maculata, 3-nervia. *Scapus* gracilis. *Inflorescentia* subspicata, 4–6 cm. longa; bracteae hyalinae, albae, fertiles late ovatae, inferiores breviter, superiores longe acuminatae, steriles multo angustiores. *Pedicelli* vix ulli. *Perianthium* e basi subovoidea tubulosum, 8–9 mm. longum, segmentis arcte conniventibus; segmenta exteriora ovato-oblonga, obtusa, sub apice transverse gibbosa, 6–7 mm. longa, apice lilacina, caeterum alba, interiora ungue lineari 5–6 mm. longo albo, lamina patentirecurva obovata obtusa 4 mm. longa superne lilacina. *Filamenta* 7 mm. longa, filiformia; antherae ex tubo breviter exsertae. *Ovarium* 3-lobum; stylus 2 mm. longus; stigma minute 3-lobum; ovula ad 15 in quoque loculo.

A bulbous *herb*, 15–25 cm. high and perfectly glabrous. *Bulbs* ovoid-globose, 7–10 mm. in diameter, white with fleshy scales, in clusters of 3–8, one central, the others in a ring around it, all or most of them producing a flowering scape. *Leaves* 2 with each scape, tightly embracing its base, lanceolate-strap-shaped, narrowed at both ends, upwards incurved from the margins, or almost folded and recurved, 16 cm. long, 1–1·75 cm. broad, somewhat fleshy, green, upwards usually dark red or purple, sometimes obscurely spotted with dull purple, margins finely cartilaginous, primary nerves 3, slightly impressed on the face. *Scape* slender, with purple spots. *Spike* 4–5 cm. long, rather loose, barren at the tip; bracts hyaline, white, the fertile broad-ovate, short (the lower) or long acuminate, 1·5–3 mm. long, the barren very narrow, linear-lanceolate to awl-shaped. *Pedicels* almost entirely suppressed. *Flowers* with the scent of lilies of the valley. *Perianth* tubular from a slightly asymmetric almost ovoid base, 8–9 mm. long, at the middle 3–3·5

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LONICERA GRIFFITHII.

Afghan-Indian Frontier.

CAPRIFOLIACEAE. Tribe LONICEREAE.

LONICERA, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 5; *Fritsch. in Engl. & Prantl, Nat. Pflanzenf.* IV. 4. 166.

Lonicera Griffithii, Hook. f. & Thoms. in Journ. Linn. Soc. II. 173 (1858); unica species subsectionis *Thoraciantharum*, Rehd., insignis bracteolis cuiusque verticilli in cupulam ovaria obtegentem connatis.

Frutex alte scandens, trunco vetusto funiformi, ramis iunioribus primo glaucis deinde rubescentibus glaberrimis vel rarius laxe molliter glanduloso-pilosis, cortice tandem exteriore laminis tenuibus soluto interiore persistente cinerascente. *Folia* petiolata, forma valde varia; infima rami minora, approximata, caetera dissita; lamina foliorum inferiorum oblonga, obtusa, basi sensim in petiolum attenuata, 1.4-5 cm. longa, 0.5-1.5 cm. lata, intermediorum et superiorum late ovata vel elliptica vel rotundata, obtusissima, saepe late emarginata, basi breviter cuneata vel rotundato-truncata vel subcordata, omnino integra vel varie lobata, lobis utrinque 1 vel 2 saepe inaequalibus, 1.5 cm. longa lataque, glauca, glaberrima, raro pilis perpaucis tenuissimis conspersa, nervis lateralibus utrinque 3-4 uti reticulatione venarum pallidis; petioli infimi breves, sursum incrementum et ad 1 cm. longi, summi plerumque brevissimi, glaberrimi vel rarius glandulo-pilosi. *Inflorescentia* pedunculata, terminalis, capitata, e verticillis 2-4-nis contiguus composita; pedunculus brevissimus vel saepe magis minusve elongatus, ad 1.5 cm. longus, parce pilosus; verticilli 4-6-flori, bracteati; bractee primariae 2-nae, lineares, ad 5 mm. longae, hispido-ciliatae, secundariae 4-nae, similes, sed multo minores, tertiariae flores ipsos subtendentes in cupulam subintegram persistentem connatae. *Receptaculum* ellipsoideo-globosum, parce glanduloso-pilosulum. *Calyx* alte 5-fidus; segmenta lanceolata, acutissima, hispido-ciliata et glanduloso-pilosula, 1-1.5 mm. longa, stellatim patentia. *Corolla* amoene rosea, 2-2.5 cm. longa, extra glanduloso-pilosa; tubus rectus vel magis minusve curvatus, subcylindricus, basin versus sensim attenuatus, limbo paulo brevior, intus parce minute pilosus; limbus 2-labiatus, labio supero erecto ad tertiam vel quartam partem 4-lobus, infero patulo aequilongo lineari obtuso. *Stamina* 2 antica corollam aequantia, lateralia paulo breviora, posticum fere dimidio brevius; filamenta glabra; antherae 2-2.5 mm. longae. *Stylus* stamina lateralia aequans; stigma capitatum, subbilobum. *Ovula* 4 in quoque loculo, 2-seriata. *Bacca* matura ignota.—Aitchison in Journ. Linn. Soc. XVIII. 64 (1881); Boiss., Fl. Or. Suppl. 275 (1888); Purpus in Mitt. Deutsch. Ges. 1901, 45; Rehder in Sargent, Trees and Shrubs, I. 47, tab. 24 (1902) et Syn. Gen. *Lonicera*, 201 (1903); C. Schneider, Handb. Laubholz. II. 745, fig. 466, g, h (1911); Gard. Chron. LX. 43 et 44 with fig. (1916).

A tall climbing *shrub* with mostly glabrous, rarely softly and loosely hairy branches, whose glaucous reddish or purplish outer bark peels off in thin flakes. The blades of the stalked *leaves* vary remarkably in size and shape; those at the bottom of the growing branches are oblong, blunt at the top and gradually narrowed

at the base and measure 1.4-5 cm. by 0.5-1.5 cm., whilst the intermediate and upper are very broadly ovate, elliptic or almost circular and three times as large, with a rounded and often notched top and a shortly wedge-shaped or truncate or even slightly cordate base; they are entire or, particularly the intermediate, lobed with the lobes (1 or 2 on each side) often very unequal in size and shape; they are always very glaucous with whitish nerves and veins and mostly quite glabrous; the stalks of the uppermost leaves are generally very short, those of the other leaves up to 1 cm. long. The *flowers* are collected in terminal more or less stalked compact heads which are made up of 2 or 3 or even 4 closely superposed whorls of 4 or 6; each whorl represents a pair of 2- or 3-flowered cymes and is surrounded by a glaucous glabrous almost even-rimmed cup formed by the fusion of the bractlets of the flowers and concealing completely the receptacles or "inferior ovaries"; below each whorl there are 4 minute paired and 2 longer (up to 5 mm.) single, very narrow and stiffly ciliate leaflets, the secondary and primary bracts of the cymes, those of the lowest whorl being distinctly visible, whilst those of the following whorls are more or less hidden behind the preceding cup or partly suppressed. The *receptacles* are free, ellipsoid or almost globose and minutely glandular-hairy. The *calyx* is exserted from the cup and 5-cleft with spreading lanceolate, very acute rigidly ciliate segments, 1-1.5 mm. long. The 2-lipped *corollas* are of the purest pink with some crimson in the throat, 2-2.5 cm. long and finely glandular-hairy on the outside; the tube is slender and about as long as the limb, whose upright broad upper lip is shortly and bluntly 4-lobed, whilst the spreading lower lip is linear and blunt. The longest *stamens* (the front pair) equal the corolla, the lateral are shorter and the dorsal one shortest; their filaments are glabrous. The equally glabrous *style* is about as long as the lateral stamens and bears a large indistinctly 2-lobed stigma. The mature *fruit* is unknown.

DISTRIBUTION.—Afghan-Indian borderland; Upper Kuram valley, 2,100-2,800 m., *Aitchison*, 535; Kafiristan and adjoining Chitral, 1900-3,300 m., *Griffith*, 91, 752; *Gatacre*, *Mainwaring*, *Toppin* and others.

The readers of the Gardeners' Chronicle of 1916 will remember a leader consisting largely of a communication by Col. F. G. L. Mainwaring of Wabey House, Upway, on the honeysuckle figured here, in which its charms were extolled. It is no doubt one of the most handsome species of the genus and Boissier in the Supplement (1888) to his Flora Orientalis justly hailed it as "*Species . . . elegantissima et cultura digna.*" Griffith discovered it in Kafiristan in 1840 and Aitchison found it in 1879 farther south on the Afghan-Indian frontier. Then the Chitral expedition of 1895 led to the re-discovery by Gen. Gatacre and Col. Hamilton of the plant in Griffith's old collecting ground, and there also Col. Mainwaring's observations were made in 1898. If it took, nevertheless, over 70 years before it was definitely* added to our horticultural treasures, this must be ascribed to the inaccessibility of its native country and partly, perhaps, to some inherent difficulties in raising it. Col. Mainwaring tells us that he succeeded in germinating and bringing it to flower only after many failures extending over more than ten years. He grows it in an unheated conservatory where it climbs over a wire-trellis. As it extends in Chitral to near the snow line, it should not be difficult to grow it in this country in the open, where it is not exposed too much to early frosts and enjoys plenty of sunlight. In its home it is a common climber in shrubs and even tall trees which it overruns with its glaucous foliage and its profuse clusters of pink flowers, the effect being finest when it invades the Holme Oak and produces a marvellous contrast of colours. Griffith tells us that the Kafiris love it, and Aitchison declares it "one of the grandest things" he had seen in the Kurram district, whilst Col. Mainwaring is even more enthusiastic in its praise. The branch figured here came from the garden of the Countess of Ilchester at Abbotsbury, Dorset, who had it from the Colonel.

Rehder, the last monographer of *Lonicera*, created a special subsection *Thoracianthae* for the reception of this species, basing it as the name indicates on the fusion of

* It appears in a list of trees and shrubs grown at Darmstadt in 1901, but does not seem to have succeeded.

the floral bractlets into a cup whose sides surround the flowers like a breastwork. This character is, in fact, so striking that one might be inclined to attribute to it a higher taxonomic value, but in every other respect the affinity with *L. Periclymenum* is so manifest, that generic separation is out of the question, and the more so as a very similar condition occurs in some species of another section of *Lonicera* (*Isika*, e.g., *L. coerulea* and *L. iberica*), where it is equally uncorrelated with other deviations from the type of the group.

Fig. 1. a flowering branch, nat. size ; 2, a corolla, nat. size ; 3, corolla cut open slightly enlarged ; 4, flower-head after the fall of the corollas, $\times 6$; 5, one of the flower-whorls seen from above, with the corollas removed, $\times 3$; 6, section through the same, lower down, $\times 3$; 7, receptacle and calyx in longitudinal section, $\times 6$; 8, style and stigma, $\times 2$.

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ISOTREMA CHRYSOPS.

China.

ARISTOLOCHACEAE. Tribe ARISTOLOCHIEAE.

ISOTREMA, *Raf. in Journ. de Phys., Paris*, lxxxix. 102 (1819), et in *Amer. Monthl. Magaz.* IV. 195 (1819). Hocquartia, *Dumort., Comment. Bot.* 30 (1822); *Van Tieghem in Journ. de Bot.* XIV. 68 (1900); *Pilg. in Engl. & Prantl, Nat. Pflanzenf. Nachtr.* III. 100 (1906). Siphisia, *Raf. in Med. Bot.* 62 (1828); *Klotzsch in Monatsber. Ak. Wiss. Berlin*, 1859, 584. Aristolochia, Div. I., incl. sectiones Asterolytes, Siphisia et Hexadon, *Duchartre in Ann. Sc. Nat. 4me sér.* II. 29 (1854) et in *DC. Prodr.* XV. 1. 433 (1864); Sect. Siphisia, *Benth. & Hook. f., Gen. Plant.* III. 125 (1880); *Solederer in Engl. & Prantl, Nat. Pflanzenf.* III. 1. 27 (1889).

Isotrema chrysops, *Stapf (sp. nov.)*; arcte affinis *I. heterophyllo*, *Stapf*, (nov. comb. ex *Aristolochia heterophylla*, *Hemsley*), sed foliis plerisque plane hastatis, floribus maioribus, limbo perianthii laevissimo aureo-marginato et ore aureo distinctum.

Frutex ad 5 m. scandens, novellis fulvo-tomentosis, ramis] mox calvescentibus fuscisque vetustis lignosis. *Foliorum* inferiorum lamina cordato-ovata vel plerumque uti caeterorum ovato- vel oblongo-hastata basi sinu late aperto et lobis rotundatis, ad 12 cm. longa, per lobos 5—7 cm. lata, medio 2—3 cm. lata, facie primo laxe pilosula, deinde glabrescens, viridis, dorso primo fere pannosa, deinde incano-pubescens, nervis basalibus pedatis utrinque 2—3, lateralibus utrinque 2—4, venis laxe intertextis vix conspicuis; petiolus gracilis, 3—3.5 cm. longus, pubescens. *Flores* solitarii, raro 2-ni, ex axillis foliorum superiorum penduli; pedicelli flexuosi, graciles, 4—7 cm. longi, laxe pilosi, 1.5—3 cm. supra basin bracteolam latam cordatam sessilem vel breviter petiolatam 1—1.5 cm. longam gerentes. *Receptaculum* cylindricum vel subclavatum, villosulum, 12—15 mm. longum, 6-costatum. *Perianthium* in alabastro extra tomentosum, deinde laxe pubescens, flavo-viride; tubus refracto-curvatus, tenuiter costatus, infra flexuram 2 cm. longus et ad 9 mm. latus, supra eam circiter 3 cm. longus, ex ortu lato ad diametrum 3—4 mm. constrictus, tunc ampliatus, ad os 6—8 mm. latus, intra flavo-viridis et glaber zona purpurea pilis tenuissimis multiramosis araneosa 4—5 mm. lata paulo supra basin sita excepta; limbus 3-lobus, 2.75 cm. diametro, lobis aequalibus transverse deltoideo-ovatis obtusis 1 cm. altis 1.7 cm. latis laevissimis praeter margines aureos fusco-purpureis, ore crasse marginato aureo. *Stamina* per paria contigua; antherae 3 mm. longae, late oblongae. *Gynostemium* crassum, 1.5—1.75 mm. longum, albidum; stigma crasse 3-lobum, vertice fuscum, lobis latis obtusis. *Ovarium* 6-loculare. *Capsula* ignota.

A climber up to 5 m. long, with all the young parts covered with a yellowish felt of hairs; the branches slender, soon becoming more or less glabrous and at last dull brown; the old stems woody. The long-stalked leaves vary somewhat in shape and very much in size; the blades of the lower leaves are broad-ovate from a heart-shaped base without any distinct lateral lobes

or, more often, like the others halberd-shaped with a wide sinus, rounded side-lobes and a lanceolate or oblong middle-lobe 2-3 cm. wide, the whole blade measuring up to 12 cm. in length and 4-7 cm. across the basal lobes; the dark green upper-surface is at first loosely hairy, but soon becomes almost glabrous, whilst the covering of the lower surface changes from a dense felt to a greyish soft down; there are 2 or 3 basal and 2-4 lateral nerves on each side. The pendulous *flowers* rise generally singly from the axils of the upper leaves and are borne on slender flexuous pedicels, 4-7 cm. long and, some distance above the base, provided with a broad cordate sessile or shortly stalked green bractlet which may drop off. The *receptacle* is cylindric or narrowly club-shaped, 6-ribbed, 12-15 mm. long and villous when young. The *perianth* is tomentose in the bud, but loosely downy and yellowish-green when fully developed; the tube is sharply recurved below and constricted at or just above the middle, measuring 2 cm. by 9 mm. below the flexure and 3 cm. by 3-4 mm. (at the constriction) or by 6-8 mm. (at the mouth); it is glabrous and yellowish inside except for a purple belt 4-5 mm. wide a little above the base, the belt being partly covered with reversed extremely fine branched hairs which form a kind of cobweb; the limb measures 2.75 cm. across and is regularly 3-lobed, the lobes being broadly and bluntly ovate and quite smooth, and it is marked off from the tube by a projecting annular rim; this rim is golden-yellow like the edges of the lobes which are otherwise brownish-purple or chocolate-brown. The 6 *anthers* are adnate in pairs to the short stout stylar column which is crowned by the bluntly 3-lobed fleshy *stigma* whose top is brown and slightly warty. The *ovary* is 6-celled with numerous 1-ranked ovules.

DISTRIBUTION.—China; East Szechuan, Wushan, Herb. A. Henry 5620 (1888); Taning, 1600 m., Wilson 4564 (1910); West Hupeh, Hsingshan, 1300-1500 m., Wilson 367 (1907).

The plant from which the accompanying plate was drawn was raised at Edinburgh from seed collected by Wilson (No. 367) near Hsingshan, N.W. of Ichang, and

received through Sir John Stirling Maxwell in 1908. Plants of the same origin were exhibited at the Chelsea Show of 1912 by the Hon. Vicary Gibbs of Aldenham House, Elstree. Others exhibited as *Aristolochia heterophylla* on the same occasion by Messrs. James Veitch & Sons may also be referable to our species; they were probably from an earlier introduction as there is a specimen of *I. chrysops* in the Kew Herbarium which was received from Messrs. Veitch in 1905 with a note, according to which it was raised from seed collected by Wilson in Hupeh (see also *Hortus Veitchii* 357; 1906).

The name *Aristolochia heterophylla* was given by Dr. Hemsley to a species based on a number of specimens collected by Professor A. Henry in western and north-western Hupeh. A closer examination of them, however, has shown that they cover three species.* Of these the one to which the bulk of the material belongs and for which the name "*heterophylla*" will have to be retained represents a plant having ovate-cordate leaves and flowers about 2.5 cm. long (straightened out) with a spotted throat and a purple coarsely papillose or warty limb which measures up to 1.5 cm. in diameter. These characters are not compatible with our plant which consequently has to be considered as a distinct species.

The question whether "*Aristolochia*" should be treated as one genus or as a group of genera has been debated by botanists on and off for the last hundred years. Space forbids to enter into the history of the problem. It is, however, reflected in the synonymy of the genus *Isotrema* as given in the heading to the text of this plate. Van Tieghem has summarised the extensive literature on the morphological and anatomical structure of *Aristolochia* and proposed the segregation of the group to which our plant belongs as a distinct genus, reviving for it Dumortier's name *Hocquartia*, being no doubt unaware of the fact that this name was forestalled by

* Of the numbers quoted by Hemsley (in *Journ. Linn. Soc.* XXVI. 361, 1891) the following are covered by the emended diagnosis—3493, 6417a, 6490 and 4665 in part (the flower in the capsule attached to the specimen of that number). No. 6417 is a fruiting specimen with halberd-shaped leaves of a somewhat different colour, down and texture, whilst No. 4665 (the branch) appears to be conspecific with Wilson 925, a plant with much larger flowers and a spotted densely hirsute limb, for which I propose the name *Isotrema lasiops*.

Rafinesque's description of *Isotrema*, a genus like *Hocquartia* based in the first instance on *A. macrophylla* (syn. *A. siphon*). *Isotrema*, in the sense of Van Tieghem's *Hocquartia*, is characterised (1) by the presence of 3 "sepals" which are united for the greater part of their length into a tube, but partly free in the limb; (2) the arrangement of the stamens in pairs opposite to the "sepals"; (3) the heteromorphism of the carpels, only 3 of them growing into styles and stigmas; (4) the dehiscence of the capsule which is at the same time septicidal and septifragal; (5) the development of the rhabdophore and the upper half of the integument into a structure which finally becomes conspicuously differentiated from the seed proper and may even separate from it; (6) the presence of clusters of crystals of calcium-oxalate in the stem and root and (7) the absence in the epidermis of the leaves of oil-containing cells that grow into the underlying parenchyma. Whilst some of Van Tieghem's statements if extended to all the species which become referable to the genus may require some qualification, his diagnosis is on the whole correct and such as would justify the recognition of the group as a genus. *Isotrema* so conceived ranges over a considerable part of Eastern Asia from Nepal to China, Formosa and southern Hondo and over North America from California to Guatemala and the Alleghanies. It consists of 3 or 4 undergroups of which that including *I. chrysops* is the largest in species and area, comprising about a dozen species in China and Japan (here *A. Kaempferi*) and four in the United States, among them the well-known *A. macrophylla*.

The plant appears quite hardy at Edinburgh, where it is grown as a wall-plant out of doors. It flowers freely and produces fruit, seeding, however, poorly. The quaintly coloured flowers are set among an abundant foliage, a combination which ought to produce an ornamental effect if free play is given to the development of the plant.

O.S.

Fig. 1, a flowering branch, nat. size; 2, a leaf from the older part of the plant, nat. size; 3, a corolla halved, nat. size; 4, the base of a corolla halved, with stamens and stigma, $\times 3$; 5, a section through an ovary, $\times 7$.

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TAB. 8958.

PRUNUS INCISA.

Japan.

ROSACEAE. Tribe PRUNEEAE.

PRUNUS, L.; *Benth. & Hook. f., Gen. Plant.* I. 609; *Focke in Engl. & Prantl, Nat. Pflanzenf.* III. 3, 51.

Prunus incisa, Thunb., *Fl. Jap.* 202 (1784); a *P. nipponica* cui maxime affinis differt petiolis pilosis, foliis minoribus tenuiter acuminato-dentatis dentibus eglandulosis, receptaculo tubuloso.

Frutex vel rarius *arbuscula* ad 8 m. alta et tunc trunco ad 30 cm. diametro cortice cinereo tecto; rami patentes vel obliqui cum ramulis comam rotundam formantes, cortice primo brunneo vel fusco mox cinerascente lenticellato, longiores virgati, intervallis 1·5—2 cm. ramulos valde abbreviatis (brachyblastos) florentes vel fasciculato-foliatos gerentes. *Folia* petiolata, post anthesin evoluta; lamina late elliptico-ovata vel obovata magis minusque acuminata, duplicato-vel triplicato-serrata dentibus tenuiter acutis vel acuminatis apice eglandulosis, 1·5—4·5 cm. longa, 1—2·5 cm. lata, utrinque parce pubescens (imprimis in nervis), dorso tenuiter reticulata, nervis utrinque 6—8; petiolus gracilis, 5—7 mm. longus, pilosus, apice saepissime utrinque glandulam stipitatam purpuream gerens vel glandulae ad laminae basin translatae; stipulae laxe glanduloso-fimbriatae lineares, ramorum longiorum petiolum fere aequantes. *Flores* 2-ni vel solitarii, rarius 3-ni, e gemmis in brachyblasto solitariis vel 2—5 aggregatis orti; perulae exteriores perbreves, latissimae, subcoriaceae, interiores rotundatae, glanduloso-fimbriatae, papyraceae vel membranaceae, albiae; bractee 2 foliaceae, dentatae; pedicelli graciles, 6—12 mm. longi, glabri, bracteolis angustis parce dentato-fimbriatis basi muniti. *Receptaculum* cylindrico-tubulosum, 4—6 mm. longum, 2·5 mm. diametro, glabrum, viride, passim purpureo-suffusum. *Sepala* late ovata, acuta, minute dentata, ciliolata, 2—3 mm. lata. *Petala* rotundato-elliptica, breviter 2-loba, alba, roseo-suffusa, 1·2 cm. longa. *Stamina* 30; filamenta ad et supra medium receptaculum inserta, summa longiora, ad 4 mm. longa, sepala superantia. *Stylus* gracilis, parce pilosulus; stigma minute lobulatum. *Drupa* subglobosa, ad 6 mm. longa, atro-violacea; putamen 4 mm. longum. Franch. & Savat. Enum. Fl. Jap., I. 118 pro parte (1875) et II. 327 (1879); Maxim. in Bull. Acad. Sc. Petersb. XXIX. 99 pro parte (excl. syn. *P. subhirtella*) et in Mel. Biol. XI. 692 (1883); Matsumura, in Bot. Mag. Tokyo, XI. 100 (1901) et Ind. Pl. Jap. II. 2. 215 pro parte (excl. syn. *P. subhirtella*; 1912); C. Schneider, Handb. Laubholz. I. 607, fig. 339 g-g' (1906) et II., 979 (1912); Koehne in Sargent, Pl. Wilson, I. 258 (1912) et in Mitt. Deutsch. Dendr. Gesellsch. 1917, 49, fig. 10; Koidzumi in Journ. Coll. Sc. Tokyo, XXXIV. 283 (1913); Wils., Cherries of Japan, 19, t. 5 (1916); *Cerasus incisa*, Lois. in Nouv. Duham. V. 33 (1812); Ser. in DC. prod. II. 538 (1825). *Microcerasus incisa*, Roem. Syn. III. 95 (1847). *Ceracoides apetala*, Miq. in Ann. Mus. Lugd. Bat. II. 93 (1865-1866; quoad syn. *Prunus incisa*) et Prol. Fl. Jap. 25 (1866-1867).

A *shrub* from 1·5 to 6 m. high or a small tree up to over 8 m. high with a round head and a grey trunk up to 30 cm. in diameter. The young slender glabrous long-shoots are covered with a smooth reddish-brown bark

which eventually becomes grey and rough from lenticels ; they produce, in the second year, numerous spurs with foliage and floral buds and further long-shoots. The *foliar* and *floral buds* are covered with papery scales, the outermost of which are very short, broad and dry, whilst the following are much larger, rounded or obovate and fringed with short gland-tipped cilia and tend to become herbaceous upwards ; in the foliar buds they are succeeded by normal leaves on stunted or elongated axes (spurs and long-shoots), whilst in the floral buds there is generally only one pair of entire or 3-lobed toothed green bracts and a pair of flowers (rarely 3) or a solitary flower, supported at the base by small foliaceous oblong or lanceolate toothed bractlets. The *leaves* are borne on slender permanently hairy stalks carrying at their upper end a pair of stalked purple glands, or these glands are transferred to the base of the blade ; the blades are broadly elliptic-ovate or obovate and more or less acuminate, measuring 1·5 to 4·5 cm. by 1 to 2·5 cm. ; they are coarsely toothed from the base, the teeth being toothed again, all the teeth ending in fine glandless points ; they are sparingly and somewhat coarsely pubescent on both sides, but become finally almost glabrous, except along the nerves of which there are 6–8 pairs ; the stipules are narrowly linear and loosely fimbriate, short in the leaves of the spurs, but almost as long as the leaf-stalks in those of the long-shoots. The *flowers* are borne on slender glabrous pedicels 6 to 12 mm. long. Their *receptacle* is tubular, 4 to 6 mm. long and about 2·5 mm. wide, glabrous and green or purplish, or, after flowering, quite red or purple. The *sepals* are broadly ovate, sparingly and minutely toothed and ciliate and 2 to 3 mm. long. The *petals* are rounded-elliptic with a shortly 2-lobed tip, white, more or less suffused with rose and about 1·2 cm. long. The *stamens*, of which there are 30, are inserted in successive whorls from the middle of the receptacle upwards, the uppermost exceeding the sepals, but being much shorter than the petals ; the anthers are bright yellow. The *style* which almost equals the longest stamens is loosely hairy. The *fruit* is an ellipsoid-globose cherry, up to 6 mm. long and purplish-black or almost quite black.

DISTRIBUTION.—Japan ; south eastern Hondo from the province of Suruga to the neighbourhood of Tokyo.

Although discovered by Thunberg at Hakone almost one hundred and fifty years ago this species has remained relatively unknown, and is even now very rare in gardens. It is rather local in its occurrence and in many respects so similar to the much more common and more widely distributed *P. nipponica* that the latter has often been mistaken for it. It can, however, be readily distinguished from it by its hairy leaf-stalks and smaller blades. It is particularly abundant, Mr. Wilson says, on the eastern and southern slopes of Mount Fuji (Fuji Yama, Fuji San) and on the mountains near Hakone, and so beautiful when in flower in the latter part of April and the first week of May as to make it worth a journey there. It is usually shrubby in its growth, but may under favourable conditions form small trees. Japanese gardeners appreciate it much and train it as a dwarf-tree in pots, hence one of its popular names “mame-sakura,” that is dwarf-cherry. Grown thus it flowers freely and is very ornamental. The petals fall early, but the rich red or purple colouring which the receptacles and the persistent stamens assume compensate for their loss.

The specimen from which the plate was prepared was kindly communicated by Mr. F. R. S. Balfour who grows the plant at Dawyck, Stobo (Peebles), Scotland. He informs us that he received the plant from Sir Isaac Bailey Balfour some eight years ago and planted it out in ordinary silurian soil with a surface of leaf-mould soil. It proved perfectly hardy, but in order to prevent the beautiful flowers from being spoiled by severe spring frosts he potted it subsequently and put it in a cold house. It is at present about 5 feet high and flowered last year at the end of March, came into leaf early in May and fruited (very sparingly) in the first half of June. A curious form with almost simple teeth whose points run out into fine awns occurs occasionally along with the typical form.

O.S.

Fig. 1, a flowering branch, nat. size ; 2, a foliage branch, nat. size ; 3 and 4, intermediate scales of a floral bud, $\times 6$; 5, foliaceous bracts, $\times 6$; 6, bractlets at the base of a pedicel, $\times 6$; 7, a flower after the fall of the petals, $\times 4$; 8, the same halved longitudinally, $\times 7$; 9, a petal, $\times 2$; 10, a fruit, nat. size.

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MILLETTIA DURA.

Equatorial Africa.

LEGUMINOSAE. Tribe GALEGEAE.

MILLETTIA, Wight & Arnott; *Benth. & Hook. f., Gen. Plant.* I. 498; *Taub. in Engl. & Prantl, Nat. Pflanzenenf.* III. 3, 270; *Dunn in Journ. Linn. Soc.* XLI. 123 (1912).

Millettia dura, *Dunn, l. c.* 233; affinis *M. oblatae*, *Dunn*, sed vexillo ovato et carina haud falcata distincta.

Frutex erectus vel scandens vel saepius *arbor* ad 12 m. alta, trunco gracili ligno duro, cortice cinerascens, novellis rufo-tomentosis mox calvescentibus. *Folia* impari-pinnata, stipulata stipellataque, 6—9-iuga; rhachis angulata, facie subcanaliculata, rufo-hirsutiuscula, cum petiolo basi tumido 3—7 cm. longo 15—25 cm. longa; foliola oblonga, rarius ovata (inferiora), acute acuminata, basi rotundata vel terminale potius acutum, a basi ad apicem increscentia, 2.5—8 cm. longa, 2—3 cm. lata, papyracea, amoene viridia, matura praeter costam gracilem subtus prominulam fere glabra, nervis lateralibus utrinque 4—8, petiolulo 3.5—4.5 mm. longo suffulta; stipulae lineares, rufo-tomentosae, 5—10 mm. longae; stipellae filiformes, rufo-pilosae, 1—2 mm. longae, saepe deciduae vel inconspicuae. *Paniculae* racemiformes, singulae vel 2-nae e basi ramulorum hornotinorum ortae, oblique patentes, pedunculo 3—7 cm. longo et, ut omnes inflorescentiae axes, rufo-piloso incluso 10—15 cm. longae, ad 20-florae; ramuli ad nodulos 1—2 mm. longos crassiusculos bracteatos 1—4-floros redacti; bractae subfiliformes, 3—4 mm. longae; pedicelli graciles, 8—12 mm. longi, sub calyce ipso minute bracteolati. *Flores* nutantes, 2.5—3 cm. longi. *Calyx* late tubulosus, 8—10 mm. longus et 7—8 mm. diametro, viridis, rufo-pubescent, obscure et breviter 2-labiatus, labio supero 3-dentato dentibus triangularibus vel mucroniformibus ad 2 mm. longis, labio infero subintegro late rotundato. *Corolla* coeruleo-rosea, ad vexilli laminae basin aureo-maculata; petala omnia dorso sericea; vexillum in ungue 5 mm. longo angulo recto recurvum, lamina late explanata ovato-quadrata emarginata basi truncata 2 cm. longa lataque vel paulo latiore; alae carinae appressae nisi apicem versus oblique patentes, ungue filiformi, lamina quadrato-oblonga obtusissima paulo brevior; carina valde compressa alis fere aequilonga, apice obtusa, eius petalis alis simillimis. *Staminum* tubus 22—23 mm. longus; filamentum liberum 25 mm. longum. *Discus* annularis, tenuis, inconspicuus. *Ovarium* lineare, fulvo-sericeum, 16 mm. longum, sensim in stylum glabrum curvatum attenuatum. *Legumen* oblanceolato-lineare, acutum, 12 cm. longum, sursum ad 2 cm. latum, fulvum, glabrum, dehiscens, valvis lignosis exsicando tortis. *Semina* lenticularia, 8—10 mm. diametro, atra, funiculo albedo lato brevi suspensa. *M. ferruginea*, *Dawe in Journ. Linn. Soc.* XXXVII. 537 (1906) et *Rep. Miss. Uganda*, 12, 13 (1906), non *Hochst.*

A slender-stemmed *tree* up to over 12 m. high or an erect or climbing *shrub* from 1 to 3 m. high with all the young parts covered with a felt of reddish or yellowish hairs; old stems up to 7.5 cm. in diameter. The ever-green pinnate *leaves* have 6 to 9 pairs of opposite leaflets and an odd terminal one and are accompanied at the base

by short linear red-haired stipules; the leaflets are shortly stalked with minute thread-like stipellae at their base; they increase in size from the base upwards from 2.5 cm. by 2 cm. to 8 cm. by 3 cm., changing at the same time from ovate to oblong and also becoming more acuminate; they are fresh green, papery and, in the mature state, almost glabrous except along the slender midrib; the common spindle is slender, reddish hairy and continues downward into the leaf-stalk which is conspicuously swollen at the base; stalk and spindle measure together from 12 to 20 cm. The *inflorescences* rise singly or in the number of 2 from the bases of the season's shoots and below their leaves, apparently from few-scaled floral buds; they represent panicles with the branches reduced to short stumps which bear red-haired narrow bracts and 1 to 4 flowers, thus resembling simple or compound racemes; including the peduncle (3 to 7 cm.) they are 10 to 15 cm. long; the flower-stalks are slender, about 8 mm. long and bear close to the flower a small bractlet. The bright green more or less downy *calyx* is wide and tubular, about 8 to 10 mm. by 7 to 8 mm.; it is indistinctly 5-toothed and 2-lipped, the upper lip being represented by 3 short teeth, the lower by a very short and broad lobe formed by the almost complete fusion of 2 teeth. The fully open *corolla*, seen from the front, is rose-coloured with a tinge of blue towards the periphery, towards the centre it is almost carmine except at the base of the blade of the standard where there is a triangular yellow mark; all its petals are silky on the back; the standard is borne on a slender claw almost as long as the nearly square and slightly notched blade which is about 2 cm. long; the wings are for their greater part appressed to the keel which they exceed slightly in length, being about 28 mm. long; their blades are like those of the keel-petals square-oblong with a very obtuse slightly oblique top. The silky *ovary* is linear, tapering gradually into the curved glabrous style. The *Pods* are flat, narrow, wider upwards, 12 cm. by nearly 2 cm. where widest, tawny and smooth; their woody valves twist when the pod opens. The *seeds*—5 or 6 in a pod—are lentil-shaped and black, measuring 8 to 10 mm. in diameter.

DISTRIBUTION.—Equatorial Africa. Uganda: Toro; Kibale forest, Mubuka valley, 1,700 m., *Scott Elliot*, 7,544; 1,400–1,600 m., *Dawe*, 452, 459, 481; Mwengi, *Snowden*, 44; Mpanga river, *Bagshaw*, 1,071; Ankole, 1,500 m., *Doggett*. Ruanda, Niansa mountain, *Kandt*, 112.

Millettia dura was discovered by Mr. G. F. Scott Elliot in Toro on the eastern flanks of the Ruwenzori mountains in 1894. It has since been repeatedly collected in the same district where, so Mr. M. T. Dawe to whom we owe the introduction of this charming plant tells us, it is one of the characteristic trees of the immense Kibale forest. The late Mr. Doggett who accompanied Sir Harry Johnson to Uganda in 1899 also found it in Ankole whilst Mr. Dunn, the monographer of *Millettia*, records it, from German material, from Ruanda, still farther south. Whether Millbraed's specimens, enumerated by him under *M. ferruginea*, belong here as Mr. Dunn suggests is doubtful, as the collector says that the tree flowers before the leaves are out. *M. dura* grows, it seems, generally into a tree, but Mr. Dawe also found it forming low shrubs or climbing on other trees. It possesses a remarkably hard wood—hence its specific name. At Kew the plant which was raised from seed supplied by Mr. Dawe in 1905 is grown as a climber in the Palm House against the west face of the house. It flowers there at the end of June, considerably later than in its home. It has produced several stems, the strongest being 3 to 4 m. high with a diameter of almost 3 cm. near the base. It is from this plant that the present plate has been prepared.

Many of the species of *Millettia*, particularly when climbing, recall in habit the wistarias with which we are so familiar, but they can be readily distinguished by the fact that in *Millettia* the flowers spring from secondary axes of the inflorescence which may as in our species be reduced to mere stumps (racemiform panicles), whilst in *Wistaria* they spring from the primary axis and may therefore be said to be truly racemose. The number of species of *Millettia* known has been more than doubled during the last 15 or 20 years and runs now to about 140, half of which are confined to tropical Africa, whilst the

other half ranges from India to sub-tropical China and sub-tropical Australia, and in a single species to Japan and another to Norfolk Island. Mr. Dunn places *M. dura* in his section *Sericanthae* which contains mostly erect shrubs or trees with racemiform panicles, silky petals and non-auricled standards. It numbers 23 species, often very nearly allied, half of them West- and half East-African. This section approaches, however, very closely another section, *Afroscandentes*, which is almost entirely West African and differs from it mainly in the climbing habit.

O.S.

Fig. 1, flowering branch ; 2, leaflet, back view ; 3, anterior half (lower lip) of the calyx ; 4, posterior half (upper lip) of the same ; 5, standard ; 6, one of the wing-petals ; 7, one of the keel-petals ; 8, sheathed stamens ; 9, free, stamen ; 10, pistil. Figs. 1-7, nat. size ; 8-10, $\times 2$.

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TAB. 8960.

LILIUM CENTIFOLIUM.

China.

LILIACEAE. Tribe TULIPEAE.

LILIUM, Linn.; *Benth & Hook. f., Gen. Plant.* III. 816; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 60.

Lilium centifolium, Stapf. in *Gard. Chron.* LXX. 101 (1921); maxime affine *L. leucantho*, Baker, sed statura alta, bulbillis nullis, foliis angustioribus plerisque 1-nerviis, perigonio extra vivide colorato distinctum.

Herba bulbosa, ad 2·5 m. alta. *Bulbus* globosus, paulo depressus, circiter 6 cm. altus, 8 cm. latus, squamis crassis ferrugineo-succineis apice fuscis circiter 9—10-nis in quoque orbi. *Caulis* glaucescens, ad foliorum insertiones fusco-maculatus, medio 9 mm. diametro, bulbillis nullis. *Folia* numerosissima, a basi sursum longiora, nisi sub inflorescentiam breviora et latiora, horizontaliter patula, plurima linearia vel angustissime lanceolato-linearia, utrinque sensim attenuata, longiora ad 45 cm. longa, 5—7 mm. lata, 1-nervia (*i.e.*, costa tantum conspicua), subsumma lanceolata, 20—15 cm. longa, ad 18 mm. lata, 3-nervia nervis lateralibus tenuibus, summa inflorescentiam verticillatim subtendentia circiter 6-na, 10 cm. longa, ad 25 mm. lata, tenuiter 5—7-nervia, omnia facie atro-viridia, dorso pallida et fere glauca, glaberrima. *Flores* 7—18, in racemum brevem dispositi, in pedicellis subpenduli, suaveolentes; pedicelli patuli vel oblique ascendentes, 10—12 cm. longi, bracteam foliaceam 8—5 cm. longam gerentes. *Perianthium* in alabastro perfecto subclavatum, ad 15 cm. longum, apertum infundibuliforme, e basi sensim dilatatum, segmentis apice revolutis, circiter 12 cm. longum et per os 8—10 cm. diametro, extra vivide coloratum, intra praeter fundum citrinum candidum; segmenta exteriora anguste oblanceolato-oblonga, superne 22—28 mm. lata, extra praeter margines superiores magis minusve purpurascentia, interiora elliptico-oblonga in unguem linearem angustum minute ciliolatum attenuata, 36—44 mm. lata, extra virescentia costa fusco-purpurea, omnia apiculo obtuso papilloso; nectaria linearia, viridia, glabra. *Filamenta* 10—11 mm. longa, ad medium papillosa; antherae ad 2 cm. longae, polline ferrugineo. *Ovarium* cylindricum; stylus 9·5 cm. longus, basi per 2—2·5 cm. papillosus, apicem versus incrassatus; stigma depresso-capitatum, 3-lobum, 8 mm. diametro. *Capsula* oblonga, basi breviter contracta, circiter 6 cm. longa, 2·5 cm. diametro. *Semina* ambitu oblique obovoidea, 8—9 mm. longa lataque. Groves in *Gard. Chron.* LXXI. 228, 229, fig. 120 (1922). *L. Brownii kansuense*, Farrer in *Journ. Roy. Hort. Soc.* XLII. 81 (1916) and *On the Eaves of the World*, II. 3 (1917); *Cl. Elliot* in *Gard. Chron.* XXVIII. 93 (1920); *Journ. Roy. Hort. Soc.* XLVI. p. lxxviii. (1921). *L. sp.* (F. 316) Farrer in *Journ. Roy. Hort. Soc. l.c.*

A lily with a densely leafy somewhat glaucous stem, up to 2 or even 2·5 m. high, which springs from a slightly depressed bulb, about 8 cm. in diameter and covered with thick fleshy dark honey-coloured scales. The very numerous leaves are dark green above and paler or almost glaucous below; they increase upwards in length until, some distance below the flowers, they decrease again,

becoming wider at the same time ; they spread horizontally, curving downwards very slightly towards the tips ; all but the uppermost are linear or lanceolate-linear, tapering towards both ends, measuring up to 45 cm. in length with a width of 5 to 7 mm. and, their lateral nerves being very obscure, they appear generally 1-nerved ; the uppermost, including those which support the inflorescence in a whorl, are lanceolate, 20 to 10 cm. by 18 to 25 mm. and distinctly 3-nerved, or those of the whorl 5- to 7-nerved. The sweet-scented *flowers*, 6 to 18 in number, are disposed in a short almost umbel-like raceme and slightly pendulous on their horizontal or oblique pedicels ; they are 15 cm. long, measured in the mature bud. The fully open *perianth* is funnel-shaped, widening from the very base upwards into a wide mouth with revolute tips and measuring about 12 cm. by 8 to 10 cm. across the mouth ; within, the perianth is of a pure white which, in the throat, passes into a light lemon-yellow, whilst without it is richly flushed with dark purple on the narrow outer segments, and greenish with a deep brown-purple midrib on the broader inner segments ; the nectaries are linear, green, and not bordered with papillae. The *filaments* are densely papillose up to the middle and bear rust-red anthers about 2 cm. long. The *style* is papillose at the base for about 2 to 2·5 cm. and conspicuously thickened below the depressed stigma which is about 8 mm. in diameter. The *capsule* is oblong and shortly contracted at the base and measures about 6 cm. by 2·5 cm. The numerous flat *seeds* are obliquely obovate and 8—9 mm. long.

DISTRIBUTION.—See below.

It was in June, 1914, that Reginald Farrer came across this very stately lily in a cottage garden near Siku (approximately 104° 20' E. Long., 33° 15' N. Lat.) in Kansu. This is how he describes his discovery :—" It was here at a turn in the path, that in the strip of a garden under a cottage wall, I saw the first of the two specimens, that were all I ever came on, of a regalish-leaved lily, so enormous and magnificent in promise, that I suspect it of being that obscure and wrongly named problem, *L. Brownei* 'kansuense,' which is certainly not *L. Brownei*,

and almost equally certainly really not 'kansuense,' being in both these instances at least, a treasure of cottage gardens of which there was no trace anywhere to be seen or heard of in the neighbourhood as a wild plant." In the autumn (end of October) of the same year he had the satisfaction of securing from the same source ample mature seed to send home. Six years later Mr. Clarence Elliot exhibited the lily at a meeting of the Royal Horticultural Society on July 27th, it having flowered then for the third year in his nursery at Stevenage (Herts). The same year Kew received flowering specimens from Mr. F. C. Stern, who grew them in his garden at Highdown, Goring-by-Sea (Sussex), whilst a bulb also obtained from Mr. Stern came into flower last June, when the present plate was prepared. Mr. Elwes also grew it at Colesborne and it was owing to his interest in the plant that I undertook a preliminary revision of the "*Brownei*" group which eventually was published in the Gardeners' Chronicle of August 20th, 1921. To this I have little to add, except that I feel now doubtful as to the inclusion of Henry's plant from Fang in Hupeh. The description I gave there of *L. centifolium* as having "pure white" flowers, a character taken from a note of Henry's, has in any case to be emended in accordance with that given here. Thus the natural home of the lily remains still to be discovered, if it has not altogether its origin in a Chinese garden with *L. leucanthum* as an ancestor. Mr. Elwes and Mr. Groves have suggested a relationship with *L. sulfureum*. No doubt this exists in a wider sense, but having watched both species as they grew side by side and flowered in the Conservatory at Kew last year, *L. centifolium* at the end of June, *L. sulfureum* in October I have come to the conclusion that the two plants are more definitely distinct than *L. centifolium* and *L. leucanthum*. *L. sulfureum* produces bulbils as *L. leucanthum* is said to do normally—there are specimens in the Kew Herbarium without such, but as they represent only sections of flowering stems, they afford no conclusive proof; besides it is doubtful whether the production of bulbils can always be depended upon—and it has, as the name implies, sulphur-yellow flowers whose segments connive so as to form a tube which is cylindric from the

base upwards for a considerable distance before it widens funnel-fashion; further its filaments are glabrous throughout and so is also the style.

Whether *L. centifolium* will become a permanent and general acquisition for gardens in this country has still to be seen. It has grown well out of doors in some places—Mr. Clarence Elliot grew it on a rockery without any particular attention being given to it and in one case it produced an inflorescence of 18 flowers, and Mr. F. C. Stern was equally successful. In Kew, it was planted out in the Conservatory where it was for two or three weeks an object of much admiration owing to its size and the beauty of its flowers which seemed almost too large for the slender stem and suggested the need of a more sturdy support in exposed places such as the grounds of most gardens, or else of a perfectly wind-sheltered corner.

O.S.

Fig. 1, upper part of a flowering plant, $\frac{1}{6}$ of nat. size; 2, bulb, $\frac{1}{2}$ nat. size; 3, part of stem with leaves, near the middle; 4, leaf from the upper part of the stem; 5, a flower seen from the front; 6, same in profile; 7, nectary of an outer perianth segment; 8, nectary of an inner perianth segment; 9, stamen; 10, pistil; 11, capsule; 12, seed, $\times 2$; figs. 3—11, nat. size.

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DICTAMNUS ALBUS VAR. CAUCASICUS.

Crimea and Caucasus.

RUTACEAE. Tribe RUTEAE.

DICTAMNUS, *Benth. & Hook. f., Gen. Pl. I. 287; Engler in Engl. & Prantl, Nat. Pflanzenf. III. 4. 133.*

Dictamnus albus, L., Sp. Pl. ed. I. 383, var. **caucasicus**, Rouy in Rouy et Fouc., Flore de France IV. 139 (1897); omnibus partibus maioribus, foliis latioribus, petalis superioribus ovatis vel elliptico-ovatis basi rotundatis et abrupte in unguem attenuatis a planta typica divergit.

Herba erecta, caulibus teretibus leviter pubescentibus glandulis atro-brunneis sessilibus conspersis. *Folia* pari- vel imparipinnata; foliola 11—14, ovata vel elliptica, apice acuta et inconspicue emarginata, basi angustata, sessilia, inter se inaequalia, 4—8.5 cm. longa, 1.5—4 cm. lata, margine minute dentata, costa nervisque facie fere planis dorso prominentibus, nervis lateralibus utrinque 6—10, infra pilis brevibus conspersa, supra fere glabra. *Inflorescentia* paniculata, circiter 6 dm. longa, albo-pilosula glandulis interspersis; bracteae bracteolaeque lineares vel anguste lanceolatae, acuminatae, 0.5—2 cm. longae; pedicelli 0.3—2 cm. longi. *Sepala* 5, lanceolata, 6—8 mm. longa, 2—3 mm. lata, dorso marginibusque pubescentia et glandulosa. *Petala* 5, patentia, acuta, 3.2 cm. longa; 4 superiora adscendentia, ovata vel elliptico-ovata, basi plus minusve rotundata et abrupte in unguem 3—4 mm. longum attenuata, 1.3 cm. lata, rosea, venis purpureis; infimum declinatum, elliptico-lanceolatum, 9 mm. latum, basi gradatim angustatum, vix venosum. *Stamina* 10, declinata, filamentis filiformibus apice setiformibus 2—2.5 cm. longis inferne leviter pubescentibus roseis superne glandulosis luteo-viridibus, antheris 1.5 mm. longis. *Ovarium* 5-lobum, 3 mm. longum, 3 mm. diametro, stipite 3 mm. longo suffultum, glanduloso-hispidum, brunneo-purpureum; stylus filiformis, declinatus, glaber, coccineus; stigma capitatum. *Capsula* 5-locularis, stipitata, valvis hispidis. *Semina* ovoidea, 4—5 mm. longa, nitentia, atra. *Dictamnus Fraxinella*, Pers., var. *caucasicus*, Fisch. et Mey., Index sextus seminum, Petropol., 1840, 49; Boiss. Fl. Or. I. 920 (1867). *D. gymnostylis*, Stev. in Verz. taur. Pf. 1857, 100. *D. caucasicus*, A. Gallet in Rev. Hort. Belg. XXXII. 254, f. 59 (1906).

An erect *herb* of tufted growth with pubescent and glandular stems. The *leaves* are pinnate with 11 to 14 ovate or elliptic leaflets, which are 4-8.5 cm. long and 1.5-4 cm. broad, minutely toothed at the margin and with 6 to 10 lateral nerves on each side of the midrib, nearly glabrous above but with short scattered hairs below. The *inflorescence* is paniced, about 6 dm. long and has a covering of white hairs mixed with dark reddish-brown glands; the bracts and bracteoles are narrow, acuminate and 0.3 to 2 cm. long. The 5 *sepals* are lanceolate, slightly unequal, 6-8 mm. long, 2-3 mm. broad and softly hairy with scattered glands in addition. The 5 *petals* are spreading, acute and 3.2 cm. long; the upper 4 are 1.3 cm. broad, ovate or elliptic-ovate and rounded below

before passing abruptly into a claw, rose in colour, veined with purple; the lowest one is not so broad, gradually narrowed below and not or inconspicuously veined with purple. The 10 *stamens* have slender filaments, thread-like at the apex and glandular in the upper part while the lower is slightly hairy. The *ovary* is 5-lobed, stalked, 3 mm. long, 3 mm. in diameter, densely covered with glands and hairs and brown-purple in colour; the style is slender, curved down and not hairy. The *capsule* is 5-locular, stalked, and has rough valves. The *seeds* are ovoid, 4-5 mm. long, shining and black.

DISTRIBUTION.—Caucasus and Crimea (*Callier, Munro, Saint Supéry*).

The handsome plant which is the subject of the present plate is apparently the Caucasian and Crimean representative of the polymorphic Linnean species *Dictamnus albus*, which, in its various forms, stretches across Central and South Europe and Central Asia, from Spain to Manchuria, China and Corea. A considerable number of names, specific and varietal, have been applied to various wild and cultivated plants which are placed under *Dictamnus albus*, L., by most authors. There seems no sufficient basis for altering this arrangement, until cultural and breeding experiments indicate the stability, or otherwise, of the various types, and the relative value of the characters hitherto used. The variety *caucasicus* is chiefly recognised by the shape of its upper ascending petals, which are more ovate and decidedly more abruptly contracted into their claws than they are in the plants regarded as typical. There are, however, other, possibly minor, and doubtfully constant, distinctions, such as the larger general habit, the broader leaflets and glabrous style.

In cultivation the variety *caucasicus* makes a finer show than the type. It can easily be raised from seed and is most suitably grown as a border plant in light and dry soil. At Kew it fruits and seeds abundantly. For the specimen figured in our plate we are indebted to Miss Willmott, who grew it in her garden at Warley Place, Great Warley, Essex.

W. B. TURRILL.

Fig. 1, upper part of an inflorescence and of a leaf, nat. size; 2, upper part of a filament and dehiscent anther, $\times 6$; 3, a flower, with the petals and stamens removed, $\times 2$; 4, fruit (a small specimen), nat. size; 5, seed, $\times 3$.

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DEUTZIA PULCHRA.

Philippines and Formosa.

SAXIFRAGACEAE. Tribe HYDRANGEAE.

DEUTZIA, *Thunb.*; *Benth. & Hook. f., Gen. Plant.* I. 642; *Engl. & Prantl, Nat. Pflanzenf.* III. 2a. 72.

Deutzia pulchra, *Vidal, Pl. Vasc. Filip.* 124 (1886); affinis *D. ningpoënsi*, Rehder, sed petiolis longioribus, stylis semper 5, fructibus multo maioribus distinguitur.

Frutex erectus, ramosissimus, ramis iunioribus squamis stellatis obtectis mox glabrescentibus. *Folia* lanceolata, elliptico-lanceolata vel ovato-lanceolata, apice acuta vel aucminata, basi subrotundata vel cuneata, 4—7 cm. longa, 1·6—2·7 cm. lata, costa nervisque in pagina inferiore prominentibus, in pagina superiore leviter impressis, nervis lateralibus utrinque 8—12 marginem versus anastomostantibus, margine dentibus parvis acutis instructa, supra pilis stellatis saepissime 5—6-radiatis conspersa, infra pilis vel squamis multiradiatis oblecta; petiolus 5—8 mm. longus, squamis multiradiatis obtectus. *Inflorescentiae* paniculatae, ramos laterales terminantes, 5—7 cm. longae, rhachi et florum omnibus partibus externis squamis multiradiatis dense obtectis; pedicelli circiter 5 mm. longi; bracteae caducae, lineares, 1·5 mm. longae; alabastra pendula, ovoidea, apice obtusa vel rotundata, petalis induplicato-valvatis. *Receptaculum* subglobosum, calycis lobis 5 late ovato-triangularibus subacutis inclusis circiter 5 mm. longum. *Petala* linearia vel lineari-lanceolata, acuta, 1·2 cm. longa, 4 mm. lata. *Stamina* in verticillos 2 disposita, filamentis planis vix 1 mm. infra apicem trifidis, lobo intermedio antherifero, exterioribus 1 cm. longis, interioribus 9 mm. longis; antherae fere 2 mm. longae. *Styli* 5, filiformes, liberi, 1 cm. longi, glabri; stigmata capitata. *Capsula* 5-locularis, subglobosa, 4—5 mm. alta, stylis 5 persistentibus patentibus instructa. *Semina* oblonga, compressa, membranaceo-alata, 1·5 mm. longa. C. K. Schneider in Mitt. Deutsch. Dendrolog. Ges. 1904, 180 et Illustr. Handb. Laubholz. II. 931 (1912); Merrill and Merritt in Philipp. Journ. Sci. V. 351 (1910); Rehder in Sargent, Pl. Wilson. I. 18 (1911).

An erect *shrub*, much branched and with the younger branches covered with many-rayed scales, though later becoming more or less glabrous. The *leaves* vary from lanceolate to ovate-lanceolate, with an acute to acuminate apex and a nearly rounded to cuneate base; the blade is 4 to 7 cm. long and 1·6 to 2·7 cm. broad with the nerves prominent below and slightly impressed above; the upper surface has a covering of stellate hairs with 5—6 rays, whilst the lower is much more densely covered with many-rayed scales, a similar covering occurring on the leaf-stalk. The *inflorescences* are paniced, 5 to 7 cm. long and terminate lateral branches whose covering of many-rayed star-like scales is continued through all

portions up to the external parts of the flowers. The flower-stalks are 5 mm. long and the bracts narrowly linear, falling off as the ovoid pendulous buds expand. The *receptacle* is broadly and shortly cup-shaped, of a total length of 5 mm., and crowned by five broadly triangular subacute *sepals*. The *petals* are linear or linear-lanceolate, acute and about 1.2 cm. by 4 mm. The *stamens* are in two whorls, an outer with filaments 1 cm. long and an inner with filaments 9 mm. long, all having two lateral arms or appendages about 1 mm. below the apex. The *styles* are constantly five in number, free one from another, 1 cm. long, glabrous and slightly turned outwards before ending in the knob-like stigmas. The *capsule* has five compartments, is nearly round and 4-5 mm. in diameter, with five persistent spreading styles. The *seeds* have membranous wings.

The interesting and beautiful plant here figured was raised from seed by the Marquis of Headfort, Headfort House, Kells, and apparently flowered three years after the seed was sown. Lord Headfort obtained the seed from Sir Frederick Moore who received it from the Arnold Arboretum with the information that it had been collected by Wilson in Formosa, Wilson's number being 10906. The plants were considered too tender for the climate of the Arnold Arboretum and no attempt was made to grow them there, but the seeds were distributed.

Deutzia pulchra is the only species of the genus which is known from the Philippines, where it is limited to the districts of Abra, Lepanto, and Benguet in the north-east of the island of Luzon. Its range was considerably extended to the north by its discovery in Formosa, at Bankinsing, by Dr. A. Henry. In the Philippines it is stated to occur in the upper pine-region in ravines and on open slopes. From dates given on the labels in the Kew Herbarium it would appear to flower between October and March in its native habitats, but it seems that shrubs in flower might be found throughout the year.

The exact value to be ascribed to the character of the hair-covering on the upper and lower surfaces

of the leaves is somewhat doubtful. In the cultivated specimen figured, the upper surface of the leaves is provided with branched star-like hairs, each with 5 to 6 rays, whilst the lower surface has a denser covering of scales with many rays. The difference between hairs and scales is by no means sharp when all the plant-parts are examined in a series of specimens, and, in most of the dried material seen, especially that from the Philippines, there is little to distinguish the coverings on the two sides of the leaf, except that on the upper-surface the scales are much more scattered.

The genus *Deutzia* has its headquarters in China, from which country over forty species are already known. Three, or possibly four, species occur in India and one in northern Asia. One species, *Deutzia mexicana*, Hemsl., occurs in Mexico and is the sole representative of the genus in the New World. Within the genus, *Deutzia pulchra*, which is the only species to reach the Malay Archipelago, is placed in the section *Eudeutzia*, Engler, subsection *Scabrae*, Rehder, on account of the induplicate-valvate aestivation of the corolla in the bud and the paniculate inflorescence. Within this subsection it is distinguished from other species by the, sometimes, dimorphous character of the indumentum, by the simple toothedness of the leaves and by the constant presence of five persistent styles.

W. B. TURRILL.

Fig. 1, flowering branch, nat. size; 2, a hair from the upper side of a leaf, $\times 70$; 3, a hair from the lower side of a leaf, $\times 70$; 4, a flower with the petals removed, $\times 2$; the same, with the petals and stamens removed, slightly more enlarged; 6, a branchlet of a fruiting panicle, nat. size; 7, a capsule seen from above, $\times 2.5$; 8, a section of a capsule, upper half seen from below, $\times 2.5$; 9, a seed, $\times 20$.

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TAB. 8963.

RHODODENDRON CANTABILE.

China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Eng. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron cantabile, *Balf. f. ms.* (sp. nov.); affinis *R. achroantho*, Balf. f. et W. W. Sm., et *R. rupicolae*, W. W. Sm., ab illo inflorescentia circiter 10-flora, floribus purpureo-coeruleis, staminibus 10, ab hoc foliis maioribus plerumque ovato-ellipticis, calyce et corolla elepidotis differt.

Frutex parvus, ad 1 m. altus: rami circiter 5 mm. crassi, inconspicue lepidoti; ramuli annotini circiter 8 cm. longi, laxe foliati, 2·5 mm. crassi, squamis parvis rubris et flavis dense induti, hornotini squamis flavidis densissime obtecti. *Folia* oblongo- vel ovato-elliptica, utrinque rotundata, apice vix mucronata, 2—3 cm. longa, 0·8—1·3 cm. lata, coriacea, facie squamis leviter impressis flavidis contiguis, dorso squamis leviter imbricatis ferrugineis vel flavescentibus et papillis dense induta; costa media facie leviter impressa, dorso basi lata et prominens, squamis fulvidis; nervi laterales utrinsecus circiter 4, inconspicui; petiolus supra planus, 1·5—3 mm. longus, imbricatum lepidotus. *Inflorescentiae* capitato-globosae, terminales vel ex axillis ramorum annotinorum, sessiles, circiter 10-florae; bracteae exteriores latissime ovatae, mucronatae, dorso densissime lepidotae, facie apicem versus leviter sericeae, dense et breviter ciliolatae, coriaceae, circiter 1 cm. longae et 1·3 cm. latae; bracteolae lineari-spatulatae, superne pilosae; pedicelli vix 2 mm. longi, lepidoti. *Calyx* 5-partitus, 4—5 mm. longus, segmentis late ellipticis extra fere glabris fimbriato-ciliatis. *Corolla* purpureo-coerulea, circiter 2 cm. longa, glabra, elepidota; tubus late infundibuliformis, 6 mm. longus; lobi 5, ovati, basi auriculati, apice rotundati, haud emarginati, 6—7 mm. lati. *Stamina* 10, longe exserta, corolla paulo longiora; filamenta basin versus laxe villosa, rubescentia; antherae fere 2 mm. longae, brunneae. *Ovarium* viride, lepidotum; stylus inferne laxe pilosus, ruber, staminibus paulo longior, sub stigmate discoideo minute lobulato paulo incrassatus.

A small *shrub* with stout branches clothed with withered blackish scales; one-year-old branchlets are about 8 cm. long and 2·5 mm. thick, loosely leafy, and covered with small red and yellow scales. The *leaves* are distinctly stalked and have an oblong- or ovate-elliptic blade, rather rounded at both ends and scarcely mucronate at the tip, measuring 2—3 cm. by 0·8—1·3 cm., leathery, dark dull green above and more or less rusty-yellow beneath; they are densely covered on both surfaces with short slightly overlapping stalked scales; the scaly leaf-stalk is 1·5—3 mm. long. The *inflorescences* are dense sessile clusters of up to 10 flowers terminal or borne in the fork of the previous season's growths; the outer bracts are leathery, broadly ovate with a

distinct point, very densely scaly outside, shortly silky hairy towards the apex on the inside and densely fringed with short hairs and measure 1 cm. by 1.3 cm.; the bractlets at the base of the flower-stalks which are hardly 2 mm. long and scaly are very narrowly spoon-shaped and hairy in the upper part. The *calyx* is 5-cleft nearly to the base and 4–5 mm. long, the broadly elliptic divisions being almost glabrous on the back, but fringed with hairs. The glabrous purple-blue *corolla* is about 2 cm. long and not scaly; the broadly funnel-shaped tube is 6 mm. long, whilst the 5 ovate lobes are ear-shaped at the base and 6–7 mm. broad. The *stamens* protrude from the corolla; the filaments are laxly bearded towards the base, reddish, and the anthers pale brown. The green *ovary* is covered with small scales; the style is red and very loosely hairy in the lower part, it slightly overtops the stamens and gradually expands into the disc-like lobulate stigma.

DISTRIBUTION.—China; Yunnan, mountains north-east of Chungtien (28 N. lat.), *Forrest*, 16,583, a. 1918.

Rhododendron cantabile is a new species which Sir Isaac Bailey Balfour named *cantabile* in reference to its charming flowers which are “worth to be sung.” Mr. J. C. Williams of Caerhays Castle, Cornwall, who contributed a specimen for the Botanical Magazine, considers it the best of the “*lapponicum*” group of *Rhododendron*. The plant inhabits in its home open alpine pastures and cliffs at an altitude of 4,600 m. and flowers in July. It is perfectly hardy in Cornwall, but does not thrive in soil with much leaf-mould. We have not seen *Forrest*’s field specimens, but Professor W. W. Smith informs us that the cultivated specimen figured here is a more vigorous plant with larger leaves, this being no doubt due to cultivation. The affinity of *R. cantabile* is clearly with *R. achroanthum* and *R. rupicola*, both of which occur on the Chungtien Plateau. The former differs in its 3-flowered inflorescence and dull magenta-red flowers with usually 5 stamens and the latter in its smaller oblong-elliptic leaves and lepidote calyces and corollas.

J. HUTCHINSON.

Fig. 1, a flowering branch, nat. size; 2 and 3, scales from the scurf of a leaf in side- and top-view, $\times 60$; 4, a bract from the base of a pedicel, $\times 8$; 5, a calyx in back-view, $\times 3$; 6, a corolla, cut open and spread out, $\times 1.5$; 7, stamen, $\times 5$; 8, a pistil, $\times 5$; 9, a section through an ovary, $\times 10$.

THE

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TAB. 8964.

XEROPHYLLUM TENAX.

North America.

LILIACEAE. Tribe HELONIEAE.

XEROPHYLLUM, Michx.; *Benth. & Hook. f., Gen. Plant.* III. 826; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 22.

X. tenax, Nutt., *Gen. Am.* I. 235 (1818); affine *X. asphodeloidi*, Nutt., sed foliis latioribus, racemo multo maiore, floribus maioribus distinctum.

Herba perennis, glaberrima, e rhizomate crasso obliquo comam densissimam foliorum et scapum crebre foliatum edens. *Folia* basalia e basi paulo dilatata pallida vel purpurascens anguste linearia, sursum longissime setaceo-attenuata, 25—45 (teste S. Watson ad 90) cm. longa, ad tertiam partem 2—4 mm. lata, dura, facie atro-viridia, dorso glaucescentia, ad margines serrulato-aspera, nervis prominulis superne tenuiter striata, costa inferne dorso latiusculis; folia scapi similia, sed multo breviora et praeter basin dilatata ad margines membranaceam angustiora. *Scapus* erectus, racemo excluso 3—6 dm. longus, basi ad 1 cm. crassus. *Racemus* primo subhemisphaericus vel obovoideus, apice saepe in comam bracteata productus, 7—10 cm. latus, deinde sensim elongatus, anthesi peracta 30 vel ultra 30 cm. longus et ob pedicellos erectos angustus (ad 4 cm. latus); bracteae e basi late albo-membranacea setaceae, pedicellos subaequantes vel superiores praeter costam viridem totae membranaceae et 1 cm. vix longiores; pedicelli albi, inferiores ad 5 cm., intermedii circiter 3 cm. longi. *Perianthii* segmenta patentia, alba vel subflavescentia, oblonga vel oblongo-lanceolata, acuta vel subacuta, 8—9 mm. longa, ad 2 mm. lata. *Filamenta* perianthii segmenta aequantia rarius paulo longiora; antherae extrorsum dehiscentes, primo lineari-oblongae, 3.5—4 mm. longae, post dehiscentiam contractae, subglobosae, induratae. *Ovarium* trigono-ovoideum, sectione transversa 3-loba; ovula 6 in quoquo loculo; styli 3, revoluti, explanati ad 3 mm. longi, facie papilloso. *Capsula* late ovoidea, transverse alte 3-loba, breviter acuta vel subacuta, 4.5—6 mm. longa, loculicida. *Semina* ambitu oblique ovata, 3—4 mm. longa, acuta, sectione transversa cuneata dorso 1.25—1.5 mm. lata, pallida. Jepson, *Fl. West. Middle Calif.* 123 (1901); 2nd ed. 107 (1911); F. R. S. Balfour in *Journ. Roy. Hort. Soc.* XLI. 25, fig. 18 (1915); J. K. Henry, *Fl. South. Brit. Columb.* 83 (1915); Rydb., *Fl. Rock. Mount.* 147 (1917); P. C. Stanley in *Gard. Chron.* LXVIII. 273, fig. 275 (1920). *Helonias tenax*, Pursh, *Fl. Amer. Sept.* 1. 243 (1814).

A perennial *herb* with a stout rootstock bearing a dense tuft of sedge-like leaves and a tall leafy flowering scape. The *leaves*, which are pale or purplish at the slightly wider base, but otherwise of a rich green on the face and glaucous on the back, are tough and hard with very rough edges; they are 25 to 45 or more cm. long and 2 to 4 mm. broad and taper to a long fine point. The stout erect *scape* rises to 30 to 60 cm.; its numerous leaves are similar to those of the basal tufts, but much shorter and narrower, with wide membranous margins at the base. The *inflorescence* is a many-flowered raceme which at first is broadly

and violet can be relied upon—the figure shows them greenish or yellowish-white with a purple or violet ovary—they would suggest a plant distinct from *X. tenax*; but S. Watson's description of *X. Douglasii* fits neither, unless it was drawn up from a small-flowered and small-fruited state of *X. tenax*. Forms approaching such a condition may indeed be found not only among Douglas's specimens but also in recent collectings.

Xerophyllum comprises 2, or if *X. Douglasii* is admitted, 3 species. It forms together with 2 monotypic North American genera, among them *Helonias* (see Bot. Mag. t. 747), which has been in cultivation since 1758, and 3 small Japanese genera, the subtribe *Helonieae*. This is intermediate between the *Tofieldiace* and *Veratreae*, familiar to us through the genera from which these subtribes have derived their names, and the first of them also through *Narthecium*, a genus, like *Tofieldia*, of wide distribution.

O.S.

Fig. 1, base of tuft of leaves, nat. size; 2, inflorescence in an early state, nat. size; 3, portions of a leaf, in face and back-view, nat. size; 4, anthers, $\times 4$; 5, pistil, $\times 4$; 6, style with stigmatic papillae, $\times 6$; 7, diagrammatic section through ovary.

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TAB. 8965.

CYPRIPEDIUM HIMALAICUM.

Himalaya and West China.

ORCHIDACEAE. Tribe CYPRIPEDIINAE.

CYPRIPEDIUM, L. ; *Benth. & Hook. f., Gen. Plant.* III. 634 (1883) ; *Cypripedium*, Aschers. ; *Pfitz. in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 82 (1889), *et Nachtr.* I. 97 (1897) III. 76 (1906), *et in Engl. Pflanzenreich*, IV. 50 (1903).

Cypripedium himalaicum, *Rolfe in Journ. Linn. Soc.* XXIX. 319 (1892) ; affine *C. macrantho*, Sw., *et C. tibetico*, King ex Rolfe, sed florum plerumque minorum colore, sepalis petalisque angustioribus, staminodio luteo multo minore differt.

Herba perennis, 15—45 cm. alta, rhizomate repente, caule foliato sursum crispo-pubescente basi cataphyllis 2 vaginato. *Folia* 4 quorum infimum saepe laminam admodum reductam habet, infra medium caulem sita, ovata vel elliptica, acuta vel acute acuminata, basi in vaginam apertam contracta, 6—12 cm. longa, 3—5 cm. lata, chartacea, sparse crispo-pubescentia vel tandem glabrata. *Flos* solitarius pedunculo 7—12 cm. longo ; bractea foliacea, erecta, lanceolata, cymbiformis, 5—7 cm. longa, explanata ad 2 cm. lata ; pedicellus 0.5—1.5 cm. longus. *Receptaculum* fusiforme vel ambitu oblanceolatum, costulatum, superne pubescens, circiter 1.5 cm. longum. *Sepalum* posticum cymbiforme, apiculatum, 2—3 cm. longum, 1.5—1.75 cm. latum (explanatum), viridi-flavum, rubro-lineatum, haud vel vix reticulato-venosum, glabrum ; sepala lateralia eadem indole ac colore, sed in phyllum oblongum acutum vel 2-cuspidatum sub labio porrectum 2—2.5 cm. longum 0.6—1.4 cm. latum connata. *Petala* lanceolata, sursum longe attenuata, 2.5—3 cm. longa, 0.8—1 cm. lata, intra basin versus sparse hirsuta, caeterum sepalis similia. *Labellum* globosum vel ovoideo-globosum, 2.5—3 (raro 3.5) cm. longum, ostio antice semi-orbiculari crenulato postice lobis triangularibus proiectis constricto, extra purpureum vel fusco-purpureum nisi postice flavescens et ad ostium albicans, glaberrimum, intra fundo flavicans et purpureo-maculatum et hirsutum. *Columna* virescens, 3—5 mm. longa. *Staminodium* stipitatum, e basi subcordata ovatum, obtusum, in dorso leviter costatum, 6—9 mm. longum, luteum, nisi facie sub margine parce rubro-punctatum. *Antherae* orbiculares, 1.75 mm. latae, filamenti cornu vix superatae. *Stigma* peltatum, staminodio brevius, ambitu late ellipticum. *Capsula* (vix matura) obovoideo-clavata, 1.5 cm. longa, superne 1 cm. lata. Franch. in *Journ. de Bot.* VIII. 249 (1894) ; Rolfe in *Orchid Review* IV. 333 (1896) ; King in *Ann. Roy. Bot. Gard. Calcutta* VIII. 342, t. 448 (1898) ; Pfitzer in *Pflanzenreich*. IV. 50, 35 (1903). *C. macranthon*, Hook. f., *Fl. Brit. Ind.* V. 170 (1890), non Sw. *C. macranthon* var. *himalaicum*, Kränzl., *Orchid. Gen. et Spec.* I. 26 (1897).

A perennial herb, 15 to 45 cm. high ; the stem pubescent upwards, sheathed at the base by 2 elongated membranous cataphylls. The leaves are convolute in bud and 4 in number ; the lowest is more or less reduced whilst the others have an ovate or elliptic acute or acuminate blade, contracted at the base into an open sheath ; they are 6 to 12 cm. long and 3 to 5 cm. broad, papery and

sparingly beset with crisped hairs or at length glabrous. The solitary *flowers* are borne on a peduncle 7 to 12 cm. long and supported by a boat-shaped erect leafy bract, 5 to 7 cm. long, which surrounds the short pedicel. The posterior *sepal* is boat-shaped, 2 to 3 cm. long, glabrous and marked with deep-red lines on a greenish-yellow ground, whilst the lateral sepals are united into a single oblong and sometimes 2-toothed "synsepal" of the same colouring, which is placed below the lip. The *petals* resemble the sepals, but are lanceolate, much narrowed upwards and hairy on the face. The *lip* is of the shape of a hollow, sometimes slightly elongated globe, 2·5 to 3 cm. long, with a wide mouth, which is semicircular in front and constricted behind by triangular lobes which project across it; the lip is purple or maroon-purple on the outside except towards the back and the edge of the mouth, which are yellow and white respectively; inside it is paler and yellowish with red spots and rough hairs on the back. The *staminode* is ovate from a slightly heart-shaped base, 6 to 9 mm. long, and yellow with a slender ridge on the back. The *anthers* are 1·75 to 2 mm. in diameter and hardly exceeded by the horn-shaped appendage of the filament. The *stigma* is yellow and of the shape of an oblong shield with the papillae on the lower face. The *capsules* are shortly and stoutly club-shaped.

DISTRIBUTION.—Himalaia from Tihri Garhwal to Bootan from 2,700–4,200 m. West China; Szechuan, Tachienlu and neighbourhood, 3,000–3,600 m.

The present plate was prepared from a plant communicated by the late Mr. Elwes. It was one of a number of specimens he raised from roots which he had received from Mr. Cave, the Curator of the Lloyd Botanical Garden at Darjeeling and which had originally come from the Zemu valley in Sikkim. It was in the neighbourhood of that valley, only a few miles to the north of where it joins the Lachen Valley, that Hooker collected a suite of specimens (No. 317) of the same plant and illustrated it by one of his masterly field-drawings (No. 317). In *Flora of British India* he referred it to *Cypripedium macranthon*, but with a note which implies a suggestion of doubt. He

remarks :—" In Sikkim specimens gathered by myself, the dorsal sepal is broadly oblong, 1 in. long, and the petals as long but narrower and lanceolate, both yellow-green and striped with dark red." These are features not met with anywhere in the *C. macranthon* (B.M. t. 2938) of Swartz, which is indeed very uniform throughout its vast area (Central Russia through Siberia to the Ussuri and to Kamtchatka and northern China). They are, moreover, coupled with others affecting the sexual apparatus and, with them, form a correlated whole of distinctive characters which cannot be disregarded. Rolfe was therefore perfectly justified in treating the Himalayan plant as a distinct species. Mr. Elwes, in discussing (in Gard. Chron. LXX. 75 ; 1921) his plant referred to the, in my opinion, somewhat unsatisfactory figures of *C. tibeticum* and *C. himalaicum* in the Annals of the Calcutta Gardens, and questioned whether his plant could be *C. tibeticum*, but a glance at the figure of the latter published in this work (t. 8070) will show that this is quite inadmissible. Rolfe also included in his *C. himalaicum* specimens collected by Duthie in the north-western Himalaya in Tihri Garhwal and on the Kumaon-Nepal frontier and others collected by Pratt in the neighbourhood of Tachienlu, Szechuan. To them might be added further material sent home by Wilson from Szechuan in 1904, so that we have to ascribe to the species a wide range of distribution, covering almost the whole of the inner Himalaya and the mountain ranges of Western China within a vertical zone from 2,700 to over 4,000 m. *C. macranthon* apparently approaches this area nowhere, but it is represented in Eastern Szechuan by a close ally, *C. fasciolatum*, and through a considerable part of the area of *C. himalaicum* by *C. tibeticum*, which differs from it most obviously in the deep colouring of the flower including the staminode, and the more contracted growth.

Mr. Elwes grew the plant very successfully in a mixture of loam, leaf-soil and sand in a shady cold frame on the north side of one of his glass-houses where it flowered towards the end of June, that is, about three or four weeks earlier than in its Sikkim home. There is no reason why it should not be tried in cool corners of

rockeries to which it would certainly add a peculiar charm on account of its quaint flowers. O.S.

Fig. 1, whole plant in two sections ; 2, sepals and petals, nat. size ; 3, lip seen from above, nat. size ; 4, lip, halved longitudinally, nat. size ; 5, gynostemium, in profile, $\times 2$; 6, same, back view, $\times 2$; 7, same, front view, $\times 2$.

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TAB. 8966.

RHIPSALIS WARMINGIANA.

Brazil.

CACTACEAE. Tribe OPUNTIEAE.

RHIPSALIS, Gaertn.; *Benth. & Hook. f., Gen. Plant.* I. 850; *K. Schum. in Engl. & Prantl, Nat. Pflanzenf.* III. VI. a. 197.

Rhipsalis Warmingiana, *K. Schum. in Mart., Fl. Bras.* IV. II., 291 (1890); affinis *R. linearis*, *K. Schum.*, sed articulis crenatis, baccis atro-purpureis differt.

Suffrutex epiphyticus. *Caules* penduli, ima basi teretes, caeterum trigoni, articulato-ramosi; rami e basi brevi tereti vel complanata lineares vel elongato-lanceolati, sursum attenuati, plani et tunc ad 2 mm. crassi vel alato-trigoni (rarius tetragoni), 7–25 cm. longi, ad 1 cm. lati, virides, ad margines crenati. *Folia* ad crenas sita, ad squamulas triangulares 1 mm. longas cartilagineas albas persistentes redacta, 1.5–2.3 cm. distantia, pulvinulos minute-pilosulos subtendentia. *Flores* solitariae ex pulvinulis superioribus orti. *Receptaculum* ellipsoideo-globosum, magis minusve tetra- vel pentagonum, apice leviter constrictum, circiter 4 mm. longum et 3 mm. diametro, supra basin squamula minuta biloba ciliata instructa, pallide viride. *Sepala* 4–6, rotundata vel subacuta, 2–4 mm. longa, in petala sensim abeuntia. *Petala* circiter 12, exteriora subelliptica, 0.7–1 cm. longa, interiora anguste oblonga, 1–1.3 cm. longa, alba vel demum levissime flavescentia. *Stamina* 25–40, petalis breviora; filamenta tenuia, albido-hyalina, 6–8 mm. longa; antherae albae. *Stylus* 6–7 mm. longus: stigmata 3 vel 4, radiantia, papillosa. *Bacca* obovoideo-globosa, obscure tetra- vel pentagona, ad 6 mm. longa (in specimine viso; an ad 1.2 cm. longa ut cl. K. Schumann l. c. dixit), atro-purpurea. *Semina* perpaucula, ellipsoidea, 1.5 mm. longa, laevissima, atra. A. G. Lindberg in *Gartenfl.* xli. 8–12, fig. 5–14; Warming in *Mem. Acad. Copenhag.*, ser. 6, VI. 423 (1892); *K. Schum., Gesamtbeschr. Kakt.* 641 (1898) et in *Monatschr. f. Kakteenk.*, 1899, 151 (fig.), 154; Löffgr. in *Arch. Jard. Bot. Rio de Janeiro*, II. 91, t. 181 (1915).

An *epiphyte* with branched pendulous stems. The *branches* are quite flat or triangular (rarely quadrangular) in section with deeply concave faces, linear or elongated-lanceolate from a narrow base and attenuated upwards to a narrow point; they vary in length from 7 to 25 cm. and in width from 0.5 to 1 cm. The *leaves* are reduced to inconspicuous triangular scales which are inserted at notches, 1.5–2.5 cm. distant, along the angles of the branches; they support small delicately hairy leaf-cushions or “areoles” from which, in the upper part, the solitary flowers rise. The roundish or obscurely angled *receptacles* are seated in the notches of the branches and astride of their angles, measuring about 4 mm. by 3 mm.; they bear a minute thin scale with a ciliate 2-lobed top a short distance above the base.

The *sepals* which are short and rounded pass gradually into the petals. The inner *petals* (about 10) are linear-oblong, 1-1.3 cm. long and of a pure transparent white, or later on flushed with yellow whilst the centre of the flower is pale orange. The *stamens* number 25-40 and have whitish anthers borne on fine thread-like filaments. The *style* is 6-7 mm. long and ends in 3 or 4 radiating stigmatic branches. The *fruit* is an ellipsoid or globose dark-purple berry, in well developed specimens up to 6 mm. long, and contains a small number of *seeds* which are black, elliptic in outline, glossy and 1.5 mm. long.

DISTRIBUTION. Brazil; Minas Geraes, Calda, *Lindberg*; Lagoa Santa, *Warming*.

The species figured here was named after Professor Eugen Warming of Copenhagen who, during a three years' stay at Lagoa Santa, did much excellent work on the ecology of the campos- and forest-vegetation of the district; Lindberg's collecting, however, antedates Warming's by about twenty years. It was first introduced to cultivation in Europe in 1886 through a seedling received by Lindberg from A. Löfgren of the Rio de Janeiro Garden. There are two specimens of this *Rhipsalis* at Kew, one from Professor Schinz of Zurich, received in 1917, and the other in a collection of succulents, purchased from Mr. A. Ashridge of Pinner in 1920. It was the latter from which the drawing was prepared.

R. Warmingiana is placed in the subgenus *Phyllorhipsalis*, so named from its leaf-like spineless articulated branches. *R. Houlettii* which has been figured on t. 6089 of this work belongs to the same cycle of affinity, but may be distinguished at a glance by the shape of the articulated branches and their marginal serrations.

R. Warmingiana is not difficult of cultivation in this country if treated like ordinary succulents in a warm house with a slightly greater amount of moisture than usual. Its numerous, relatively large pearly white flowers render it very attractive. W. B. TURRILL.

Fig. 1, a part of a flowering plant, nat. size; 2, diagrammatic section through a flowering branch, showing a receptacle in longitudinal section, supported by a rudimentary leaf, $\times 3$; 3, a young flower, $\times 2$; 4, scale from a receptacle, $\times 8$; 5, flower in longitudinal section, $\times 2$; 6, a fruiting branch, nat. size; 7, a seed, $\times 15$.

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TAB. 8967.

VERONICA PIMELEOIDES.

New Zealand.

SCROPHULARIACEAE. Tribe DIGITALEAE.

VERONICA, *Benth. & Hook. f., Gen. Plant.* II. 964; *Wettstein in Engl. & Prantl, Nat. Pflanzenf.* IV. 3b. 85.

Veronica pimeleoides, *Hook. f. Fl. Nov. Zeal.* I. 195 (1854); affinis *V. Buchananii*, *Hook. f.*, sed ramis gracilioribus, foliis subcoriaceis vix imbricatis, calycis segmentis subacutis et leviter cucullatis, capsula subacuta differt.

Frutex nanus, ramosissimus, caulibus ascendentibus usque ad 4 dm. altis teretibus fusco-brunneis superne plus minusve dense pubescentibus vel fere villosis inferne leviter pubescentibus vel fere glabris. *Folia* patentia vel suberecta, vix imbricata, obovato-oblonga vel elliptico-lanceolata, subacuta vel obtusa, basi angustata, sessilia, 1—1·5 cm. longa, 6—9 mm. lata, glauca, subcoriacea, in pagina inferiore costa subprominente, in pagina superiore inconspicua, nervis lateralibus in pagina utraque haud conspicuis. *Spicae* in quoque ramo saepissime 2 (1—3), in foliorum superiorum axillis solitariae, multiflorae, 3—5 cm. longae (pedunculo 1·5—2 cm. longo incluso), pedunculo rhachique dense villosa pubescentibus; bracteae oblongo-lanceolatae, 4 mm. longae, subacutae, margine dense ciliatae. *Calyx* 4-partitus, segmentis oblongo-ovatis vel oblongo-lanceolatis apice subacutis et leviter cucullatis 3·5 mm. longis dorso leviter pubescentibus et carinatis margine dense ciliatis. *Corollae* tubus 3·5 mm. longus, superne gradatim ampliatus, fauce vix 3 mm. diametro; limbus coeruleus, 4-lobatus, lobis patentibus circiter 4 mm. longis, abaxiali lineari-lanceolato subacuto vix 1·5 mm. lato caeteris oblongo-lanceolatis obtusis 2 mm. latis. *Antherae* ante dehiscentiam purpureae; pollinis granula lutea; filamenta glabra, 2·5 mm. longa. *Ovarium* ellipsoideum vel ovoideum, compressum, apicem versus dense puberulum; stylus 6 mm. longus, glaber, purpureus, deinde albus. *Capsula* compressa, ellipsoideo-ovoidea, subacuta, 4·5 mm. longa, 3 mm. lata, septicidalis. *Semina* oblonga, complanata, 1·5 mm. longa, testa alata lutea.—*Hook. f.*, *Hand-book New Zealand Flora*, 211 (1864); *Armstrong in New Zeal. Inst. Trans.* XIII. 350 (1880); *N. E. Brown in Gard. Chron.* VIII. 69 (1890); *Cheeseman, Man. New Zeal. Fl.* 527 (1906).

A dwarf *shrub* up to 4 dm. in height, producing numerous branches which radiate from the centre and at first are more or less prostrate, but later bend up so that the younger and flower-bearing parts become erect. The young *branchlets* are reddish-brown with a generally dense covering of hairs which is mostly lost as the darker dull brown bark is developed. The paired sessile *leaves* spread or are partially erect without overlapping; they vary, often in the same individual, from ovate-oblong to elliptic-lanceolate and from slightly pointed to blunt, whilst the base is generally narrowed; they are of a characteristic glaucous-green colour, softly leathery and

inconspicuously veined. Each young shoot bears 1 to 3 axillary many-flowered compact *spikes*, 3-5 cm. long; their peduncles and spindles are densely and softly hairy and bear the flowers in the axils of ciliate bracts which slightly exceed the *calyx*. The latter is 4-cleft with oblong segments somewhat unequal in width and slightly hooded at the tip, densely ciliate along the margins and slightly hairy on the back. The *corolla* has a short tube and a blue 4-cleft limb, up to 11 mm. in diameter, with the front segment narrower and more pointed than the others. The *anthers* are purple before opening and the pollen is pale yellow. The *ovary* is compressed from the sides, elliptic to ovate in outline and densely and shortly hairy near the top; the style is at first purple, then becomes white. The *capsule* retains approximately the shape of the ovary, but has a more pointed tip and splits into the two carpels. The *seeds* are broadly elliptic in outline and rather flat, the yellowish seed-coat being produced all round into an externally ill-defined stoutish wing.

DISTRIBUTION.—New Zealand, South Island.

The *Veronica* here figured was introduced over thirty years ago. The first record of it as a cultivated plant is by Mr. N. E. Brown, who received a specimen of the plant from Mr. Lynch, then Curator of the Cambridge Botanic Garden (*Gard. Chron.* July 19, 1890, 69). The species was originally described and named by Sir Joseph Hooker from material collected by Lyall at Port Cooper. Like so many of the shrubby species of the genus it is endemic to New Zealand and within the Dominion is restricted to the South Island. Within its range, which includes the divisions of Nelson, Canterbury and Otago, it is not uncommon in dry places, though it is now apparently mainly found in the mountains between 300 and 1,000 m. altitude. In its native home it flowers from November to January.

A considerable range of variation is found within what are generally considered to be the specific limits of *V. pimeleoides*. The variation is particularly marked in the size and shape of the leaves. Cultivated specimens have on the whole larger leaves than those collected from

wild plants. The variety *minor*, originally described by Hooker in his Handbook of the New Zealand Flora, 738, from shingle beds near Lake Heron, is a much smaller plant than the type and has small, lanceolate, acute leaves. Specimens in cultivation at Kew retain this habit together with the leaf-shape and size, and, since they grow near plants of the type, the differences are very marked. A variation in the opposite direction is shown by the variety *glauco-coerulea*, Cheeseman, which was found in the same area as the type and was originally described, under that name, as a distinct species by Armstrong. In this variety the general habit is stouter and larger than in the type, the leaves are larger, more closely set and more markedly obovate, and the flowers of a darker blue or even purple colour.

Within the genus, *Veronica pimeleoides* is placed in the *buxifolia-carnosula* group of the Section *Hebe*, Benth., and about eight New Zealand species are considered to show a special degree of relationship to it. These include such well-known and often cultivated plants as *Veronica buxifolia*, *V. anomala* (figured at tab. 7360 of this work), *V. pinguifolia*, Hook. f. (tab. 6147, and probably also tab. 6587, under the name of *V. carnosula*) and *V. amplexicaulis* (tab. 7370).

The specimens from which our plate was prepared were obtained from a plant growing in the Royal Botanic Gardens, Kew. Here the species does well, both on the western side of the wall between the Herbaceous Ground and the Rockery and also on the eastern side of the Temperate House, both relatively sheltered positions.

W. B. TURRILL.

Fig. 1, a flowering branch, nat. size; 2, a flower, $\times 3$; 3, posticous (adaxial half) of the corolla, $\times 4$; 4, anticous half of the corolla, $\times 4$; 5, an anther, $\times 5$; 6, pistil, $\times 6$; 7, a ripe capsule, $\times 4$; 8, a seed, $\times 8$; 9, section through the same, $\times 8$.

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TAB. 8968.

HEMEROCALLIS NANA.

China.

LILIACEAE. Tribe HEMEROCALLEAE.

HEMEROCALLIS, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 773; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 40.

Hemerocallis nana, *G. Forrest & W. W. Smith in Journ. R. Hort. Soc.* XLII. 1. fig. 12 (1916) et in *Not. Bot. Gard. Edinb.* X. 39 (1917); affinis *H. Forrestii* Diels, sed floribus plerumque solitariis maioribus distincta.

Herba perennis, glaberrima, 10—25 cm. alta, radicibus grumosis, collo fibris foliorum persistentibus vestito. *Folia* 9—10, basi congesta, linearia, sub-obtusa, ad 15 cm. longa, 4—9 mm. lata, viridia, utrinque nervis circiter 7 tenuibus percursa. *Flores* solitarii vel rarius 2-ni, pedunculo ad 12 cm. longo erecto vel incurvo suffulti; bractee angustae, lineares vel lanceolato-lineares, acutae vel acuminatae, ad 2.5 cm. longae; pedicelli 1—2 cm. longi. *Perigonium* 6—7 cm. longum; tubus atro-fuscus, 1 cm. longus; segmenta aurantiaca, exteriora linearia, 6 cm. longa, ad 8 mm. lata, extra rubro-suffusa, interiora tenuiora, oblongo-linearia, paululo longiora et latiora, omnia eleganter recurva, apice subcucullato-obtusa, circiter 12-nervia, venis intertextis vix ullis. *Antherae* lanceolatae, 8 mm. longae. *Stylus* sursum curvatus, 3.5 cm. longus, antheras multo superans. *Capsula* obovoideo-oblonga, 3 cm. longa, valvis oblongis minute apiculatis. *Semina* ovoideo-ellipsoidea, 5 mm. longa, atra, nitidissima.

A perfectly glabrous *herb*, growing in several-headed clumps, 10—25 cm. high, surrounded at the base with the fibres of decayed leaves. The *leaves* are linear, almost acute, up to 15 cm. by 4—9 mm., green and very finely 14—15-nerved. The *flowers* are borne singly or in pairs on an erect or curved peduncle up to 12 cm. long; they are preceded by very narrow acute or finely acuminate bracts and their pedicels measure from 1 to 2 cm. in length. The widely open *perigone* is 6—7 cm. long and has a short dark tube 1 cm. long and elegantly recurved narrow blunt orange-coloured segments, the outer of which are linear, 6 cm. by 8 mm., and flushed with red on the back whilst the inner are thinner, oblong-linear and slightly longer and broader; all are traversed by about 12 fine nerves hardly visible in the fresh state and almost devoid of connecting veins. The curved *style* considerably exceeds the *anthers* which are 8 mm. long. The *capsule* is oblong, slightly widened upwards and 3 cm. long. The jet-black brightly polished *seeds* are about 5 mm. long.

DISTRIBUTION.—China. North-west Yunnan, mountains in the Yangtze bend ($27^{\circ} 45' \text{ N. Lat.}$), 3,000–3,300 m., *Forrest* 10,539.

The plant figured here is one of several dwarf species of *Hemerocallis* which Mr. G. Forrest discovered in the mountains of north-western Yunnan. He describes the habitat as stony or moist pastures and the plant as only 7.5–25 cm. high with deep red-orange flowers, a hue which they have not attained under our skies. An excellent photograph by him, published in the Journal of the R. Horticultural Society, l.c., represents the plant in its native station.

H. nana has been compared with *H. fulva*, but the affinity with that species is rather remote; it lacks especially the peculiar feathery nervation of the perigone-segments which characterizes *H. fulva*. It should rather be considered a member of a small group apparently peculiar to south-western China. The plants of this group are of a dwarf habit and possess graceful brilliantly coloured flowers with short tubes. They may briefly be characterized thus:—

Flowers solitary or paired, 6–7 cm. long *H. nana*.

Flowers 4 or more in a forked inflorescence, up to 5 cm. long.

Leaves flat, 10–13 mm. broad, the outer almost strap-shaped, blunt, the inner more tapering upwards; bracts herbaceous, 1–1.5 cm. long; perigone-tube 0.75 cm. long; outer segments closely 16-nerved with a narrow hyaline margin, drying dark brownish-green, inner about 11-nerved, 12 mm. wide (*Lichiang-range, Forrest* 2512) *H. Forrestii*.

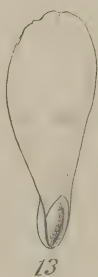
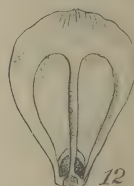
Leaves usually folded, 6 mm. wide, all long, tapering to a callous point; bracts inconspicuous; perigone-tube 1.5 cm. long, outer segments about 12-nerved with a wide hyaline margin, about 10 mm. wide, drying reddish, inner 13-nerved, 14 mm. wide (*H. fulva* var. *angustifolia*, *Diels*, non *Baker*; Tali range, *H. plicata*, *Forrest* 1896; *Mengtze, Henry* 9497) *Stapf* (sp. nov.)

The specimen from which the present plate was prepared was raised by Mr. Elwes at Colesborne. He grew it in a cool frame, but it will probably be found perfectly hardy in the milder parts of the country. As each flower lasts only one or two days and each scape produces mostly only one flower an effective display of the plant depends on the clumps being large enough to secure a sufficient succession of flowers. The two other dwarf species described above would seem to be more promising in that respect.

O.S.

Fig. 1, a plant, nat. size; 2, a section of a leaf, $\times 2$; 3, a capsule, nat. size; 4, a seed, $\times 3$.

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PICEA BRACHYTYLA.

China.

CONIFERAE. Tribe ABIETINEAE.

PICEA, Linn.; Benth. & Hook. f., Gen. Plant. III. 439; Eichl. in Engl. & Prantl, Nat. Pflanzenf. II. 1. 77.

Picea brachytyla, Pritzl in Engl. Bot. Jahrb. XXIX. 216 (1900); *P. spinulosae* Beissn., proxima sed foliis rigidioribus latoribus brevius acutis, conorum squamis pro rata minus latis opacis, seminum alis longioribus distincta.

Arbor 10—25 m. alta, coma late conica laxa; rami primarii subhorizontales, sursum ascendentes; ramuli penduli, eximie plagiotropici, iuniores diu aurantiaco-flavescentes, glabri vel puberuli, inter pulvinos lineares bene exarati, tandem cinerascens; cortex vetustus griseo-fuscus vel nigricans, profunde fissus, fissuris areas irregulariter oblongas cingentibus. *Gemmae* crebrae, conicae, saepe acutae, 5—7 mm. longae, castaneae, squamis externis firmis late ovatis subacutis. *Folia* brevissime petiolata petiolis ita tortis ut folia magis minusve prorsus directa et in planitie leviter convexa quasi imbricata fiant dorsis viridibus ad lucem versis, acicularia, breviter acuta, apice spinulosa, pungentia, 10—24 mm. longa, 1.2—1.5 mm. lata, a dorso admodum complanata, sectione transversa anguste rhomboidea marginibus costisque prominulis obtusis, dorso laete viridia, facie vittis binis latis albis stomatiferis notata vel fere tota albo-glaucis; ductus resiniferi 2, dorsales, ad costam siti; fibrae sclerenchymaticae in stratum praeter vittas stomatiferas continuum simplicem confertae. *Strobili* ♂ virides, admodum purpureo tincti, oblongi, demum elongati et ad 3 cm. longi, 5 mm. lati; connectivi appendix orbicularis, crenulatus. *Strobili* ♀ laterales et terminales, oblongi, ad 2 cm. longi, ad 1 cm. lati; carpella rotundata, obtusa vel varie producta, 3 mm. longa; squamae ovuliferae rotundatae, obscure crenulatae, sub anthesi carpellis multo maiores. *Coni maturi* penduli, oblongo-cylindrici, utrinque paulo attenuati, obtusi, 6—12 cm. longi, 2.5—3.5 cm. diametro; squamae in unguem latum obtriangularem contractae, supra late rotundato-ovatae vel late obtuseque deltoideae, longiores 16—20 mm. longae, 12—15 mm. latae, parte exserta basi fusca vel atro-fusca superne cinnamomeo-brunnea opaca. *Semen* obovato-oblongum, 3—4 mm. longum, testa alutacea, ala oblique obovato-oblonga tenui, 10—15 mm. longa 5—6.5 mm. lata. Masters in Journ. Linn. Soc. XXVI. 553 (1902); Beissner in Mitt. Deutsch. Dendr. Gesellsch. 1906, 95 et Handb. Nadelholzk. ed. 2, 249 (1909); Patschke in Engl. Bot. Jahrb. XLVIII. 630 (1913); Rehder & Wilson in Sargent, Plant. Wilson. II. 33 (1914). *P. ajanensis*, Masters, l.c.; *ibid.* XXXVII. 418 (1906) et in Journ. Bot. XLI. 269 (1903); Patschke l.c. 632 (pro parte), non Fisch.; *P. Alcockiana*, Masters in Journ. Bot. l.c., non Carr. *P. complanata*, Masters in Gard. Chron. XXXIX. 146, fig. 57 (1906); Beissner, Handb. Nadelholzk. ed. 2, 288 (1909); Bean in Kew Bull. 1910, 174; Patschke, l.c. 630, 764; *P. ascendens*, Patschke, l.c. 632, 764; *P. Sargentiana*, Rehder & Wilson, l.c. 35. *Abies brachytyla*, Franch. in Journ. de Bot. XIII. 258 (1899); Bois in Journ. Hort. France, 1900, 230 (err. *brachytula*).

A tree 10 to 25 m. high, with a wide conical open crown whose main branches are more or less horizontal with ascending tips and pendulous branchlets which are yellowish and glabrous or puberulous; the bark of old

of the Omorica spruce of the Yangtse basin as one species perhaps, with the admission of a *forma lat squamea* with flatly rounded cone-scales and a *forma rhombisquamea* with cone-scales which are produced into a deltoid upper half. To the latter belongs for instance Wilson 3031. It is represented in Masters' illustration of *P. complanata* by the figure in the upper right-hand corner. *P. brachytyla* was first introduced to cultivation by Wilson who sent seed collected in the eastern Tapa shan (No. 1282) to the Combe Nurseries of Messrs. Veitch of Chelsea in 1901 and from Tachienlu (No. 1530) in 1903. The specimens from which the present plate was prepared were kindly communicated by the Marquis of Headfort who has been growing the species at Kells, Co. Meath, Ireland, for the last ten years. His trees are at present from 3·5–5·5 m. high and they produced normal cones for the first time in 1922. The tree does well in most of the gardens in this country and one of the best specimens is to be seen in Mr. G. W. E. Loder's garden at Wakehurst, Ardingly, Sussex. It is nineteen years old and 2·5 m. high and it coned first two years ago. The principal charm of this handsome species is in the fresh colouring of the foliage, the bright green of the backs of the needles contrasting very pleasantly with the glaucous white of the reversed faces.

The northern limit of *P. brachytyla* lies slightly to the North of 32° N.L., the southern at 26° 30', whilst the vertical range is from 1600 m. to 3500 m. (north-western Szechuan). According to Wilson the tree has become rather scarce in parts of Szechuan owing to indiscriminate felling. The affinity with *P. spinulosa* Beissn. (*P. morindoides*, Rehder; see Bot. Mag. 8159) has already been indicated by Masters (1906). *P. spinulosa* is a native of Bhutan and the adjoining parts of Sikkim and a tree of sometimes very considerable dimensions. It differs from our species mainly in the finer more gradually pointed and often much longer needles and the warm brown and almost glossy colouring of the cone-scales. O.S.

Fig. 1, a young female branch, nat. size; 2, a young male branch, nat. size; 3, a leaf, back view, $\times 4$; 4, the same, face view, $\times 4$; 5, cross-section through a leaf, $\times 20$; 6, anther, dehiscent $\times 10$; 7, pollen-grain, $\times 270$; 8, ovuliferous scale with ovules $\times 3$; 9, the same in back view with the carpel, $\times 3$; 10, mature cone, nat. size; 11, cone-scale, back view, nat. size; 12, the same in face view with seeds, nat. size; 13, seed, $\times 2$.

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TAB. 8970.

CLETHRA DELAVAYI.

China.

CLETHRACEAE.

CLETHRA, *Linn.*; *Benth. & Hook. f., Gen. Plant.* II. 603 (*genus anomalum Ericarum*); *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 2.

Clethra Delavayi, *Franch. in Morot Journ. de Bot.* IX. 370 (1895); affinis *C. monostachyae*, *Rehder & Wilson*, sed foliis subtus pubescentibus (nec praeter axillas nervorum barbatus glabris), floribus maioribus, staminibus quam petala brevioribus distincta.

Fruiter vel *arbuscula* ad 16 m. alta; rami elongati steriles, iuniores saepe tumiduli, hincinde compressi vel fere ancipites, rubescentes, pube minuta stellata conspersi, breviores florentes praeterea incano-hirsuti, vetusti cortice tandem laminis annularibus tenuibus soluto obtekti. *Folia* sparsa, interdum ad basin ramorum florentium valde approximata vel in ramis elongatis hincinde subopposita vel fere ternata; laminae basi acuta vel breviter acuminata late lanceolata vel oblanceolata, acuta vel subacuminata, crebre minute glandulosa-crenulata vel serrulata, 6—12 cm. longa, 2·5—5 cm. lata, facie saturate viridis, primo minute stellata, mox glabrata, dorso incana, primo in costa nervisque adpresse hirsuta, demum pilis simplicibus delapsis ibi ut in intervallis pube stellata tantum conspersa, nervis utrinque ad 20. *Inflorescentiae* racemosae, secundae, multiflorae; racemi solitarii, in ramis abbreviatis terminales, breviter pedunculati, circiter 15 cm. longi; rhachis uti bracteae, pedicelli, calyces incana, dense stellato-tomentella; bracteae subulato-lineares, 4—4·5 mm. longae; pedicelli cernui, graciles, 6—10 mm. longi. *Calyx* fere ad basin 5-fidus, 5—6 mm. longus, segmentis ovatis dorso laete rubescentibus anthesi peracta conniventibus. *Corollae* late campanulata, alba, delicate gilvo suffusa; petala obovato-oblonga, apice lato obtuso emarginata, 9—10 mm. longa, ad 5·5 mm. lata, ad margines parce ciliata. *Stamina* 10; filamenta deorsum incrassata, pilosula, 5 mm. longa; antherae virescentes vel basi fuscae, 1 mm. vix longiores, thecis sursum divergentibus. *Ovarium* incano-tomentosum pilis nonnullis longioribus; stylus 4 mm. longus, pilosulus; stigma 3-lobum. *Capsula* matura non visa.

A *shrub* or small *tree* up to 16 m. high whose barren long-shoots are frequently slightly swollen and here and there compressed and when young more or less red and finely and loosely downy with very minute star-shaped hairs, whilst the short flowering shoots have an additional early deciduous covering of appressed simple hairs. The *leaves* are frequently crowded at the base of the flowering spurs and sometimes here and there apparently opposite or whorled on the long-shoots; their blades are broadly lanceolate or inversely lanceolate from an acute or wedge-shaped base and pointed at the tips and their margins are minutely crenate or serrate; they measure 6 to 12 cm. by 2·5 to 4 cm., are rich green above with a

delicate down (disappearing early) of minute star-shaped hairs, whilst the back is very pale or almost grey with a richer down of the same nature or, in young leaves, with additional longer appressed hairs on the nerves; there are about 15 to 20 rather straight nerves on each side; the stalks are 1 to 1.5 cm. long. The *flowers* are gathered in many-flowered one-sided racemes, which terminate short shoots, spread almost horizontally and measure about 15 cm. including the very short peduncles; the raceme-spindle, the very narrow linear bracts (4 to 4.5 mm.) and the slender nodding flower-stalks (6 to 10 mm.) are like the calyx covered with a dense almost velvety greyish down of star-shaped hairs. The 5-cleft *calyx* is 5 to 6 mm. long, its ovate segments closing up and turning deep rose or red after flowering. The widely bell-shaped *corolla* is 9 to 10 mm. long, white or faintly cream-coloured and consists of 5 broad inversely ovate very blunt notched petals with ciliate margins. The *stamens* are about half as long as the petals and have downwardly thickened hairy filaments and deeply cleft anthers, greenish or dark brown at the base and hardly 1 mm. long. The greyish closely downy *ovary* bears a minutely hairy style 4 mm. long with a 3-lobed stigma.

DISTRIBUTION.—Western and North-western Yunnan, from the Tali range west- and north-west-wards to beyond the Salween River, ranging from 2,100 to 3,000 m.

Clethra Delavayi is one of the most charming introductions from Yunnan. Although discovered as long ago as 1884, when Père Delavay found it in the mountains near Talifu, it was not introduced into cultivation until almost thirty years later, when in 1913 Forrest sent seed (No. 11,590) home which he had collected in the same district. Mr. H. White of the Sunningdale Nurseries, Windlesham, Surrey, who contributed the material from which the plate was prepared, grows *C. Delavayi* in an open wood without any shelter and it has so far stood frost very well, not having "been injured thereby except a few late-growing tips of immature wood." Other flowering specimens were received at Kew, in 1920, from Sir John Ross of Bladensburg of Rostrevor, Co. Down, Ireland, who writes that last year his plant produced

between 80 and 100 sprays of bloom "the racemes standing out parallel to the ground and mainly at right angles to the upward growth." In the beauty of the flowers *C. Delavayi*, among the clethras, is only rivalled by the well-known *C. arborea* of Madeira. This it also resembles in the shape and size of the flowers and the short enclosed stamens; nevertheless structurally it has more in common with the other less showy species of China which connect it with the only Japanese clethra, *C. barbinervis*, a species with rather open flowers and long filaments and a close congener of the clethras of the Eastern United States, which include the type of the genus, *C. alnifolia*. The area of *Clethra*, of which there are about sixty species known at present, comprises three sub-areas, two American and one Asiatic and the perfectly isolated outpost represented by *C. arborea*. Of the American sub-areas the northern covers the Eastern United States from Florida to Maine and westwards to the Mississippi whilst the southern is entirely tropical and extends from Mexico and the West Indies to Brazil and Bolivia. The Asiatic sub-area also reaches the tropics in the Malay Archipelago (Sumatra to New Guinea and the Philippines), but whilst the American sub-areas correspond to structurally distinct sections, the species of the Asiatic sub-area are more homogeneous. Whether the outlying station in Madeira can, through *C. Delavayi*, be linked with the Asiatic group—it certainly shows no close affinity to the North American species—or whether it should be attached to the tropical American section it is too early to say. On the whole it seems to be structurally as distinct as it is geographically isolated. Fossil clethras have been recorded from Europe, among them fruits enclosed in Baltic amber, but their determination is too doubtful to prove the theory of a tertiary extension of the genus from China through Europe to the Atlantic, although *a priori* it is not improbable. In *Genera Plantarum* *Clethra* was placed as an anomalous genus at the end of *Ericaceae*. It has since been removed from that order, mainly on account of its free petals, and it stands now as the only representative of a distinct family, *Clethraceae*. One of the species described originally as *Clethra*, *C. scandens*, also a Chinese species,

has been made the type of a distinct genus (*Clematoclethra*) by Maximowicz. Engler has placed it since, no doubt on account of its similarity with *Actinidia*, in *Dilleniaceae* and the question arises whether the *Clethraceae* should not find a place in that neighbourhood. They can, however, hardly be detached from the *Ericales*. Now Baillon and Hallier have pointed out the relationship of the *Ericales* with the *Theaceae*, so that the *Clethraceae* would naturally range themselves with the more primitive *Parietales*, which include the *Dilleniaceae* as well as the *Theaceae*. This, however, in view of the gamopetalous character of the remaining *Ericales*, raises the problem of the taxonomic value of gamopetaly generally and of the phylogenetic unity of the *Gamopetalae*, one of the fundamental divisions of all the more generally accepted and at any rate technically workable systems. O.S.

Fig. 1, a flowering branch, nat. size ; 2, a hair from an inflorescence, $\times 150$; 3, a petal with 3 stamens, $\times 3$; 4, a stamen, $\times 12$; 5, a calyx and pistil, $\times 5$; 6, longitudinal section through an ovary, $\times 10$.

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TAB. 8971.

ECHINOCEREUS BAILEYI.

North America.

CACTACEAE. Tribe CEREAE.

ECHINOCEREUS, Engelm. ; *K. Schum. in Engl. & Prantl, Nat. Pflanzenf.* III. 6A. 184; *Britton & Rose, Cact.* III. 3. *Cereus subg. Echinocereus, Benth. & Hook. f., Gen. Plant.* I. 849.

Echinocereus Baileyi, *Rose in Contr. U.S. Nat. Herb.* XII. 403, pl. 56, 57 (1909); inter species aculeis pectinatis munitis aculeis ad 20 mm. longis potius porrectis nec cauli adpressis, petalis apice lato dentatis dente uno alterove in aristulam producto distinctum.

Planta simplex vel caespitosa. Caulis cylindricus, obscure viridis, ad 12 cm. altus, diametro 4—5 cm., 15-costatus, aculeis laxe vel inferne dense involutus; costae crassae, rectae vel subspirales, ad 5 mm. altae et 10 mm. distantes, iugis sulcisque obtusis, illis a latere visis mammoso-crenatis, crenis circiter 7 mm. longis pulvinos angustos fere lineares ad 4 mm. longos primo dense albido-lanatos deinde glabratos utrinque pectinatim aculeatos gerentibus; aculei 16—18, magis minusve prorsus et inferiores etiam deorsum patentes, omnes laterales, graciles, primo albi, deinde flavescentes vel fusciscentes, summi breves, sequentes multo longiores, intermedi et inferiores ad 20 mm. longi, infimi vero admodum abbreviati. Flores 2 vel 3 subterminales vel 1 specie terminalis, 6—7.5 cm. longi. Receptaculum circiter 3.5 cm. longum, supra partem ovuliferam 1—1.2 cm. longam infundibuliforme, ore 2 cm. diametro, extra appendicibus cylindricis circiter 60 apice fasciculum aculeorum 9—12 lana alba intermixtum gerentibus; appendices inferiores breves, congesti, superiores sparsi, ad 5 mm. longi, eorum aculei inaequilongi, centrales 1—3 ad 6 mm. longi, brunnei, caeteri albi, breviores, omnes asperuli. Sepala lineari-lanceolata, acuta, albida, secundum nervum medianum viridivittata, gradatim in petala abeuntia. Petala carmineo-rosea, sericeo-nitentia, interiora spatulata vel oblanceolata, ad 3 cm. longa, superne 5—8 mm. lata, apice dentata uno alterove dente producto saepe aristiformi. Stamina numerosissima, ex tubo breviter exserta et in conum truncatum conniventia; filamenta 7—9 mm. longa; antherae luteae, 1—1.5 mm. longae. Stylus 2.75 cm. longus; stigmata 10, viridia, subcylindrica, obtusa, 5 mm. longa. Fructus ignotus. Britton & Rose, Cact. 111. (1922).

Stems solitary or tufted, cylindrical, dull green, up to 12 cm. high and 4-5 cm. in diameter, 15-ribbed; the blunt low ribs are transversally constricted at intervals of about 7 mm. and bear on the protuberances more or less linear spine-cushions 4 mm. long, whitish-woolly when young, but ultimately glabrous and beset on each side with a comb-like row of spines which point more or less obliquely forward, and those below the middle at the same time downward, forming a loose or, towards the base, dense envelope round the stem; the lowest and uppermost spines of a cushion are short, those from the middle down to near the base the longest (up to 20 mm.).

The *flowers* (2 or 3) spring from below the top of the stem or they are solitary and apparently terminal; they are about 6-7.5 cm. long. The funnel-shaped *receptacle* is covered, densely below and loosely above, with cylindric wart-like appendages which bear fascicles of 9 to 12 spines almost buried in white wool, the lowest of the spines being about 6 mm. long and brown, the others white. The *sepals* are narrowly lanceolate, whitish with a green stripe down the middle and they pass upwards into the *petals*. These are inversely lanceolate or spatulate with broad toothed tips, one of the teeth often running out into an awn; they are up to 3 cm. long and 5 to 8 mm. wide and of a beautiful carmine-rose with a silky lustre. The *stamens* connive into a short yellow cone from which the 10 green cylindric stigmas emerge.

DISTRIBUTION.—North America. Oklahoma, Wichita Mountains.

This charming cactus, probably the most beautiful of the *Pectinatae*-group, was in 1904 found by Mr. James H. Gaut on Mt. Scott in the Wichita Mountains, southwestern Oklahoma, and, after the original specimens had been lost, was rediscovered two years later by Major Vernan Bailey after whom it was named. Britton and Rose in their monumental monograph of the Cactaceae state that it has since been observed to be very common in the National Forest near Cache, and among a consignment received from that locality there was one forming a clump of 25 branches and measuring 3 cm. in diameter.

The specimen figured here was given by Dr. J. N. Rose to Mr. Elwes, who eventually sent it to Kew for inclusion in this work. It flowered early in June of last year and is at present (May) forming fresh flower-buds from near the white-woolly top. It shows no tendency towards branching. It is grown in the succulent pit and seems to require no special treatment. To judge by its relatively northern home it might be expected to demand little more than an airy sunny and dry greenhouse for successful cultivation.

O.S.

Fig. 1, a whole plant, nat. size; 2, the spines of an old spine-cushion, nat. size; 3, an appendage from the lower half of a receptacle, with the wool omitted, $\times 3$; 4, longitudinal section of a flower, nat. size; 5, stamens, $\times 8$.

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TAB. 8972.

CARMICHAELIA AUSTRALIS.

New Zealand.

LEGUMINOSAE. Tribe GALEGEAE.

CARMICHAELIA, R. Br.; *Benth. & Hook. f., Gen. Plant.* I. 502; Taubert in *Engl. & Prantl, Nat. Pflanzenf.* III. 3. 278.

Carmichaelia australis, R. Br. in *Bot. Reg.* XI. t. 912 (1825) excl. syn.; inter species maturitate aphyllas ramulis applanatis 2—4 mm. latis et floribus parvulis 4—5 mm. longis distincta.

Frutex maturitate aphyllus, ramosissimus, praeter novellas interdum parce strigillosas glaber, 1—4 m. altus; rami stricti, elongati, valde applanati, fere ancipites, longitudinaliter striati, 2—4 mm. lati, ad nodos 1—1.5 cm. distantes serratim incisi, saturate virides. *Folia* in planta juvenili 3—7-foliolata, ad 2.5 cm. longa, foliolis obcordatis vel obcordato-cuneatis sessilibus ad 12 mm. longis tenuibus, stipulis si adsunt minutis dentiformibus; in planta adulta ad squamulas ovatas scarosas minutas redacta, raro pauca perfecta parvula. *Flores* in racemos e ramorum incisuris ortos 3—6-flores ad 1 cm. longos dispositi, rhachii et bracteis minutis lanceolatis ovatisve et pedicellis brevissimis vel ad 2 mm. longis parce albo-strigillosis. *Calyx* viridis, campanulato-cupularis, 1.5 mm. longus, basi minute vel obsolete 2-bracteolatus, brevissime acute 5-dentatus, glaber vel parce strigillosus. *Vexillum* ex ungue angusto rotundato-obovatum, obscure emarginatum, revolutum, 4—5 mm. longum, album, violaceo-striatum vel striis hincinde confluentibus. *Alae* vexillo aequilongae, lamina quadrato-oblonga. *Carina* alis vix brevior, obtusa; eius petala apice cohaerentia, lamina basi vix auriculata. *Stamina* 4 mm. longa; antherae minutae. *Ovarium* lineari-lanceolatum, glabrum, 6—8-ovulatum; stylus sub stigmatibus ipso parce papillosus. *Legumen* a latere compressum, ambitu ellipticum 6—9 mm. longum, nigricans, apice styli basi mucronatum, valvarum lapsu dehiscens, replo persistente. *Semina* 1—3 ambitu late elliptica, 1.5—2 mm. longa, rubra, saepe nigro-punctata. Hook. f., *Fl. N. Zeal.* I. 50 (1852) et *Handb. N. Zeal.* Fl. 50 (1864); Kirk, *Stud. Fl.* 110 (1889); De Wildem., *Icon. Sel. Hort. Thénens*, i. t. 13 (1900); Cheesem., *Man. N. Zeal.* Fl. 113 (1906). *C. Cunninghamii*, Racoul, Choix, 29, t. 28B (1846). *Boissiaea scolopendrina*, A. Rich., *Fl. Nouv. Zel.* 346 (1867), non Sm.

A much-branched *shrub*, leafless or almost leafless when full grown; branches dark green, stiff, usually quite flat, 2 to 4 mm. wide, with notches at the nodes. Perfect *leaves* are present only in the young state, they rise from the notches of the branches, are up to 2.5 cm. long, bear 3 to 7 inversely cordate thin leaflets and are with or without minute stipules; in the adult state the leaves are mostly represented by tiny dry scales. The *flowers* are arranged in short 3- to 6-flowered racemes springing from the axils of the scale-leaves and about 1 cm. long; the spindle, the small bracts and very short flower-stalks are often beset

with small stiff appressed white hairs. The *calyx* is green, glabrous, shortly 5-toothed and 1.5 mm. long. The *corolla* is white with violet stripes on the standard and 4 to 5 mm. long; the standard is very broadly rounded from a short claw and rolled backward; the wing and keel-petals are only slightly shorter and have oblong blunt blades. The *anthers* are very minute. The linear-lanceolate glabrous *ovary* has 6 to 8 ovules in 2 rows and bears a slender style which is sparingly papillose just below the stigma. The *Pods* are laterally compressed, elliptic in outline and crowned by the persistent and hardened style-base; they open by throwing off the thinly leathery ultimately blackish sides, the thickened sutures and the back-ridge remaining as an elliptic frame attached to the stalk and often holding the seeds as in a window. The *seeds* are broad-elliptic in outline, 1.5 to 2 mm. long and red with or without black spots; there are 1 to 3 of them in a pod.

DISTRIBUTION.—New Zealand, North and South Islands.

This remarkable genus, which is confined to New Zealand, with the exception of *C. exsul*, a native of Lord Howe Island, has hitherto not been figured in this work. Although mostly small-flowered—only *C. Williamsii* has flowers of larger size (up to over 2 cm.)—the species of *Carmichaelia* attract attention by the frequent absence of leaves in the adult state, the flattened deep-green branches taking over their function, and by the pretty, often numerous flowers which spring in short racemes from their notches. *C. australis* was discovered by Sir Joseph Banks and Dr. Solander on the east coast of the North Island in 1769, but was not described until 1825 when Lindley figured it from a plant in Colvill's nursery with a description and notes by R. Brown. R. Brown identified it with Forster's *Lotus arboreus*, but Forster's specimen of that species in the Kew Herbarium is evidently *C. flagelliformis*, under which *C. arboreus* is also quoted by Cheeseman. Brown's description covers probably both, the part referring to the fruits being drawn up from Forster's specimen or drawing which shows fruit, the remainder from Colvill's plant. Seedling plants

regularly bear, in the notches of the flattened stems, perfect leaves with 3-7 leaflets on a rachis which is up to over 2.5 cm. long. The adult plants at Kew from which the piece figured here was taken were, but for minute rudiments, quite leafless, but flowering specimens cut from the same group of plants in 1920 show not a few leaves, up to 5 mm. long with an obovate-oblong terminal leaflet and two narrower minute lateral leaflets. The separation of the valves from the persistent replum is generally complete in *C. australis* and the majority of the species of the genus, but in some the valves remain either attached to it, or the fruit is indehiscent altogether. The formation of a "replum" is not unknown in other genera of *Leguminosae*, e.g., *Mimosa*, *Entada* and *Lysiloma*, but in none, it seems, are the seeds held in the replum as in a frame, as is the case in *Carmichaelia*. According to Cheeseman the genus is the most difficult in the New Zealand flora as far as the discrimination of the species is concerned; everything but the pods seems to be in a state of flux.

C. australis is grown at Kew out of doors in the shelter of the walls of the Temperate House where it stands the inclemencies of the winter very well. It is an early summer-flowerer here as well as in its home, the flowering seasons being June and July, and November and December respectively. O.S.

Fig. 1, a flowering branch, nat. size; 2, a flower, $\times 5$; 3, a standard, $\times 6$; 4, wing petals, $\times 6$; 5, a keel petal, $\times 6$; 6, stamens and pistil, $\times 8$; 7, staminal tube and free stamen $\times 8$; 8, pistil, $\times 8$; 9, the same cut open, $\times 8$; 10, replum with seeds, nat. size; 11, seed, $\times 6$.





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TAB. 8973.

RHODODENDRON SINOGRANDE.

China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, *Linn.*; *Benth. & Hook. f. Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. i. 35.

Rhododendron sinogrande, *Balf. f. et W. W. Smith in Not. Bot. Gard. Edinb.* IX. 274 (1916); affinis *R. grandis*, Wall., sed foliis latioribus, pedicellis dense lanato-tomentosis nec glandulosis, ovario eglanduloso, stylo valido differt.

Frutex vel *arbor* usque ad 11 m. alta, grandifolia, ramis crassis circiter 2·5 cm. diametro. *Folia* maxima, longe petiolata; lamina oblongo-elliptica vel interdum obovato-elliptica, utrinque rotundata, usque ad 5 dm. longa et 2·5 dm. lata, rigide coriacea vel chartacea, supra viridis, bullata, glabra, infra argentea, nitens, indumento compacto tenuissimo persistente oblecta, costa infra valde prominente, basi usque ad 1·3 cm. lata, glabra, nervis utrinsecus 12–16 supra sulcatis infra prominentibus et glabris; petiolus crassus, primum argenteus, demum glabrescens, supra fere planus, ad 1·5 cm. latus. *Inflorescentia* circiter 20-flora, umbellato-racemosa ad 2 dm. diametro; bracteae caducae, obovatae, circiter 5 cm. longae et 2·5 cm. latae, dorso molliter tomentosae, facie marginem versus glabrescentes; pedicelli crassi, 3–4 cm. longi, dense lanato-tomentosi. *Calyx* obliquus, lanato-tomentosus, minute et undulate denticulatus. *Corolla* nutans, carnosa, lactea, delicate flavido-suffusa, circiter 5 cm. longa, a basi late campanulata, tubo basi gibboso et rubra suffuso glabro, lobis 8 circiter 2 cm. latis late emarginatis. *Stamina* 18, corolla multo breviora; filamenta inferne puberula. *Ovarium* magnum, lanato-tomentosum, circiter 20-loculare; stylus corollae tubo aequilongus, glaber, curvatus, sub stigmate incrassatus; stigma magnum, discoideum, circiter 1 cm. diametro, lobulatum. *Capsula* tomentosa, curvata, 3 cm. longa. Gard. Chron. lxxi. 290, fig. 158 (1922).

An erect *shrub* or small *tree* up to 11 m. high, with large and handsome foliage, the young shoots about 2·5 cm. thick. The *leaf-blades* are borne on long stout stalks flattened on the upper side and soon glabrous; they are oblong-elliptic or sometimes obovate-elliptic, rounded at both ends, up to 5 dm. long and 2·5 dm. broad, rigidly leathery, glabrous, green and boldly puckered above, silvery below with a very thin compact layer of hairs; the midrib and the 12–16 pairs of nerves are prominent below and glabrous. The *inflorescence* is an umbel-like raceme of about 20 flowers, up to 2 dm. in diameter; the early deciduous bracts are obovate and about 5 cm. by 2·5 cm. and softly hairy on both sides except towards the margin inside; the flower-stalks are stout, about 3–4 cm. long and woolly-hairy. The *calyx* is very oblique, minutely toothed and woolly-

hairy. The nodding widely bell-shaped *corolla* is fleshy creamy-white, glabrous and about 5 cm. long, with a tube pouched and tinged with red at the base and an 8-lobed limb, the lobes being about 2 cm. wide and broadly notched. The 18 *stamens* are much shorter than the corolla and their filaments are shortly hairy in the lower part. The 20-celled *ovary* is large and woolly-tomentose; the curved glabrous style is about as long as the corolla-tube and thickened under the large disk-like minutely lobed stigma which is about 1 cm. in diameter.

DISTRIBUTION.—China. South-west Yunnan, Shweli-Salween divide.

This magnificent species of *Rhododendron*, as the name implies, was considered by the late Sir Isaac Bailey Balfour to be the Chinese representative of the Himalayan *R. grande*, Wall. The hairy covering on the lower surface of the leaves in the two species is very similar, but the leaves in *R. sinogrande* are larger and broader, and the pedicels and ovary lack the glands characteristic of *R. grande*. *R. sinogrande* was discovered in August, 1912, by Mr. G. Forrest on the Western flank of the Shweli-Salween divide, about 25° N. at an altitude of 3,000–3,300 m., where it occurs in rhododendron-forests and flowers in April. There it attains a height of 10 m. *R. grande* is found in a slightly more northerly latitude in the Sikkim and Bhotan Himalayas, growing from 2,100–3,300 m. altitude.

R. sinogrande should prove particularly valuable as a foliage plant, for in the opinion of Mr. J. C. Williams it has the finest leaves of any evergreen yet seen in this country. According to him the flower varies from a dull creamy-white to a yellow almost as bright as the best forms of *R. lacteum*. In Cornwall the plant appreciates good soil, ample moisture overhead, and shade.

The plant figured was presented to the late Mr. Godman, of South Lodge, Horsham, by Mr. Williams, and was grown by Dame Alice Godman, with whom it flowered in a cool greenhouse about April 25th, 1922.—J. HUTCHINSON.

Fig. 1, inflorescence and part of leaves, nat. size; 2, hairs from the lower surface of a leaf, $\times 200$; 3, a long stamen, $\times 2$; 4, anther, $\times 4$; 5, pistil, $\times 1.5$; 6, transverse section of ovary, $\times 3$; 7 (upper right-hand corner), hairs from an ovary, $\times 100$.



TAB. 8974.

GENTIANA RIGESCENS.

China.

GENTIANACEAE. Tribe SWERTIEAE.

GENTIANA, Linn.; Benth. & Hook, f., *Gen. Plant.* II. 815; Kusnezow in *Engl. & Prantl, Nat. Pflanzenf.* IV. 2. 80.

Gentiana rigescens, Franch. in *Journ. Linn. Soc.* XXVI. 134 (1890); affinis *G. melandriifoliae*, Franch., sed caulibus longioribus, foliis basi haud longe petiolatis, floribus saepissime capitatis facile distinguitur.

Herba perennis, glaberrima, multicaulis, caulibus rigidis teretibus ecostatis saepe atro-sanguineis. *Folia* dimorpha, crassa, margine leviter revoluta, caulina inferiora minima, fere squamiformia, orbicularia, 2—4 mm. longa, sensim in folia perfecta breviter petiolata abeuntia, quorum lamina ovata vel lanceolato-obovata vel superiorum ovato-oblonga, basi attenuata, apice acuta vel subobtusata, tenuiter 3-nervis, 2—5 cm. longa, 0.7—1.5 cm. lata, costa facie leviter sulcata dorso prominente; petioli oppositi basi plus minusve connati. *Flores* 1—13, saepissime dense capitati. *Calyx* membranaceus; tubus 0.9—1 cm. longus, ima basi 2 mm. ore vero truncato 4 mm. diametro, inconspicue venosus; lobi 5, saepe valde inaequales, infra apicem tubi orti, lineares et vix 2 mm. longi vel fere foliacei, ad oblongo-lanceolatum vergentes, ad 7 mm. longi et 3 mm. lati. *Corolla* tubuloso-infundibuliformis, 2.5 cm. longa, lobis late ovatis abrupte acuminatis 5 mm. longis 4 mm. latis, plicis parvis obliquis. *Stamina* aequalia; filamenta circiter 1 cm. longa; antherae 2.75 mm. longae. *Ovarium* anguste cylindricum, 2 cm. longum, stipitatum; stylus apice breviter bifidus. *Capsula* glabra, stipitata, 2.2 cm. longa, brunnea. *Semina* foveolata, 0.75 mm. longa. Kusnezow in *Act. Hort. Petropol.* XV. 235 (1904); *Gard. Chron.* LV. 15 (1914).

A perfectly glabrous many-stemmed perennial herb, the stems more or less rigid and often of a dark-red colour. The lowest of the leaves, all of which are thick and have the margins slightly rolled back, are very small, 2 to 4 mm. long, rounded and almost scale-like, whilst the following become upwards gradually ovate or lanceolate-obovate, or the upper ovate-oblong, with acute or almost obtuse tips having their bases narrowed into the leaf-stalks, which, at each node, are joined below into a short sheath; these blades are 2 to 5 cm. long and faintly 3-nerved. The flowers vary in number from a very few to thirteen, and they are generally crowded into dense heads terminating a main-stem or its branches. The calyx is membranous with a tube about 1 cm. long and 4 mm. in diameter at the truncate mouth; the lobes are often very unequal, varying from flower to

flower, some being almost leaf-like and up to 7 mm. long and 3 mm. broad, while the others are much reduced and often linear. The *corolla* varies from tubular to funnel-shaped and is 2.5 cm. long with abruptly acuminate broadly ovate lobes which are blue with minute green dots and measure 5 mm. by 4 mm., and they have small asymmetrical folds between them. The *stamens* are equal, the filaments 1 cm. and the anthers 2.75 mm. long. The *ovary* is narrowly cylindrical, stalked and 2 cm. long and terminates in a shortly bifid stigma. The *capsule* is brown, glabrous and 2.2 cm. long, including the stalk. The *seeds* are covered with a loose coat which, in the dry state, appears to be deeply pitted, the pits being separated by relatively high ridges.

DISTRIBUTION.—China. West Yunnan; Mountains of Lichiang, Tali and Szemao and westwards to the frontier of Burma.

This interesting Gentian, which has not been figured so far, is apparently limited in its distribution to Yunnan where the Abbé Delavay discovered it on Mt. Tsang above Tali in 1884 (No. 142). Here Camillo Schneider also collected it between 2,500 and 3,500 m. nine years ago. From Tali it ranges north to the mountains of Lichiang (Forrest 3091) and south to the neighbourhood of Szemao in 22° 45' N. 101° E. (A. Henry 9230) whilst Forrest traced it westwards to Tengyueh near the Burmese frontier. All over this area it inhabits dry grassy or stony downs, not flowering until the autumn has arrived and often as late as November. In this country flowering is even more delayed, and the specimens from which our plate was made were actually cut in the Botanic Garden at Edinburgh in the middle of December of last year, when the plants were still in full vigour. So late a flowering season ought to make this gentian a welcome addition to our gardens. In the circumstances it is not surprising that the plant, although perfectly hardy, does not produce mature seed with us so that propagation by division has to be resorted to. Franchet, in his original description, placed *G. rigescens* in the section *Pneumonanthe*, but the Grisebachian section of that

name was subsequently divided into four sections by Professor Kusnezow, the monographer of *Eu-Gentiana*. In this arrangement *Pneumonanthe* (in the stricter sense) is separated from the segregated section *Frigida* by the structure of the seeds which are winged in the former and wingless, and, at the same time, pitted in the latter. Neither Franchet nor Kusnezow seem to have examined the seeds of *G. rigescens*, but good samples of them received through the kindness of M. Gagnepain of the Paris Herbarium show clearly that the species belongs to the *Frigida* section, within which it appears to be closely related to *G. melandriifolia*, a relationship already indicated by Kusnezow, who has moreover described a natural hybrid between the two species which are associated with each other in the mountains of Tali and also in those of Likiang.

W. B. TURRILL.

Fig. 1, a part of a plant, nat. size; 2, a calyx, cut open, with unusually equal lobes, $\times 3$; 3, corolla, cut open, $\times 1.5$; 4, corolla lobe, $\times 4$; 5, stamens, $\times 6$; 6, pistil, $\times 3$; 7, capsule, nat. size; 8, seed, $\times 25$; cells of testa with reticulate thickening of the outer walls, $\times 160$.

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HAEMANTHUS LYNESII.

Sudan.

AMARYLLIDACEAE. Tribe AMARYLLIDAEAE.

HAEMANTHUS, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 730; *Pax in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 104.

Haemanthus Lynesii, *Stapf (sp. nov.)*; inter species gregis *H. multiflori*, Martyn, "*H. tenuifloro* var. *coccineo*," Hook. f., proximus, sed perigonii segmentis tenuioribus pro maxima parte flavis distinctus; ab *H. multifloro* ipso iisdem notis et foliorum laminis basi rotundato-contractis et floribus minoribus distat.

Herba bulbosa, glaberrima. *Bulbus* hornotinus depressus, 7.5 cm. diametro, 4.5 cm. altus, squamis flavescentibus rubro-punctatis vestitus, bulbo annotino esquamato crasse disciformi latiori insidens, initio aestatis scapum florentem, postea anthesi peracta tarde folia emittens. *Caulis spurius* 5-foliatus, ad 18 cm. altus, basi cataphyllis brevibus sub anthesi violaceis et arete imbricatis cinctus. *Folia* inferiora 3 inter se remota; vaginae tubulosae, parte exserta basi rubro-punctata; lamina ovato-elliptica, undulata, sub-acuta, basi breviter lateque in vaginam contracta, petiolo nullo interiecto, ad 12 cm. longa, 6 cm. lata, obscure viridia. *Scapus* ad caulis spurii basin ortus, circiter 13 cm. longus, 1 cm. diametro, viridis, basi rubro-punctatus. *Umbella* basi spathis 3 albidis tenuiter scariosis sub anthesi deflexis 3—3.5 cm. longis suffulta, multiflora (floribus saepe ultra 50) ambitu depresso-globosa, staminibus inclusis ad 16 cm. diametro; bractae capillares, albae, 1.5—2 cm. longae; pedicelli virides, plerique 2 cm. longi. *Receptaculum* subglobosum, 3 mm. diametro. *Perigonii* tubus sursum paulo dilatatus, 10—11 mm. longus, ruber; segmenta angustissima, linearia, minute cucullata, apice ipso fimbriolata, incurvo-patentia, circiter 15 mm. longa, explanata 0.75 mm. lata, basi pallide rubra, caeterum lutea, pro maxima longitudine tenuissime 3 nervia. *Staminum* filamenta divaricata, 2.5—3 cm. longa, igneocinnabarina; antherae aureae, nisi dorso nigricantes, vix 2 mm. longae. *Stylus* ruber, circiter 3 cm. longus.

A *bulbous herb* which produces a flowering scape about 13 cm. high in the early summer and, after flowering, a false stem about 18 cm. high and formed by the telescoped tubular leaf-sheaths; both spring from a growing bulb 4–5 cm. high with a diameter of 7–8 cm. and covered with more or less fleshy scales, the outer of which are yellowish and dotted with red, the bulb itself resting on the slightly enlarged bare disc-shaped core of the bulb of the preceding year. The *leaves*, of which there are 5 (the lower 2 or 3 distant from each other), have dull green ovate-elliptic shortly pointed blades which are rather suddenly contracted into the sheaths and measure about 12 cm. by 6 cm. The *umbel* is almost globose, about 16 cm. wide and almost as high and carries over 50

flowers ; it is supported by 3 whitish dry membranous deflexed spathe-leaves ; the green pedicels are 2 to 2.5 cm. long and have each a long fine almost hairlike white bract at the base. The *perigone-tube* is uniformly 10 to 11 mm. long, slightly widened upwards, and vermilion red ; the segments which are incurved upwards are very narrowly linear with a minutely hooded tip, 14 to 15 mm. long and pale red at the base, but otherwise yellow. The brilliantly scarlet *filaments* are 2.5 to 3 cm. long, exceeding the red *style* by 1 cm., and they bear golden-yellow *anthers* with blackish backs.

DISTRIBUTION.—Darfur ; Lake Chad-Nile divide, Kulme (about 12° 30' N. 23° 30' E.), 1050 m., *Lynes*.

This very brilliantly coloured species was discovered by Admiral H. Lynes during the Lynes-Lowe Natural History Expedition to Darfur in the early summer of 1921, when he and his party were encamped near the village of Kulme on the western side of the Lake Chad-Nile divide, S.S.W. of Jebel Marra. The description of the country with which the admiral favoured me is so vivid and interesting that I prefer to give it almost in full. He writes :—

“The hills forming the divide consist entirely of igneous rocks and are pleasantly covered with light open woods, mostly formed of Sahab-trees (*Combretum* sp.) with gnarled trunks and spreading branches suggesting, when coming into leaf in the early rains, lopped hornbeams. Here during the rainy season conditions are very favourable to the growth of ‘petalous monocots.’ Scarcely have the first showers of the season refreshed the parched soil when on all sides succulent green shoots appear, often thrusting aside the last few inches of their prison wall with volcanic violence. First come the crinums, and in ten days time the woodland glades are carpeted with their mauve-lined sprays ; a week or so later red *kaempferias* adorn the shadier nooks. Other less conspicuous kinds follow, and latest of all, quite in the middle of the rain-period, come the blood-red and orange gloriosas and flaming *Haemanthus*. By this time the shrubs, herbs, and all the grasses are well

on the way with their annual growth, but imperial *Haemanthus* demands a clear space around his fiery globe, and such spots are few and far between, and it is therefore found generally where the ground has been artificially cleared by man or browsing beast near villages, or where the rocky nature or the chemical constituents of the scanty soil keep out other plants. The result is that although our *Haemanthus* is a most lovely and conspicuous object in the landscape, it is uncommon about Kulme; furthermore, we never found it growing otherwise but singly. By September the whole countryside is choked up with a dense growth of giant grasses, 5 to 9 ft. high, and other virile plant-forms, twining, climbing and spreading in all directions and at all levels."

On his return Admiral Lynes gave some bulbs of the *Haemanthus* to the late Mr. Elwes, with whom one of the plants flowered in the latter half of July of last year. Mr. Elwes sent it to Kew that it might be drawn for this work. It was one of the last communications of that ardent plant-lover and generous supporter of the Botanical Magazine, whose contributions date back to 1875. Beginning with *Galanthus Elwesii* (t. 6166) they amount to over a hundred, including a few plants which have been reserved for the next volume. To complete the hundred was one of his modest ambitions and it gave him much pleasure when he saw it practically realised at last. Rarely has a private garden conducted on so simple lines as that at Colesborne Park yielded so much in return for the love and skill bestowed on it.

H. Lynesii has been compared with *H. multiflorus*, but it differs from it in the delayed development of the leaves which attain their full size only 6 to 8 weeks after flowering, the abruptly contracted bases of the leaf-blades, the much finer, delicately nerved perigone-segments and the brilliant scarlet of the filaments. It approaches nearer to the Abyssinian plant depicted in t. 58 of this work as *H. tenuiflorus* var. *coccineus*. This, however, is shown in the plate with a blood-red perigone (like *H. multiflorus*) and a very short tube (6 mm.). Unfortunately no specimen was preserved nor have I been

able to find any later reference to the plant in literature. This *H. tenuiflorus* var. *coccineus* may be the very imperfectly known *H. abyssinicus* of Herbert, but it can hardly be associated with the *H. tenuiflorus* of Herbert, a plant with rose coloured flowers and perigone-segments as wide as those of *H. multiflorus*.

H. Lynesii is grown like *H. multiflorus* at Kew as a stove plant. The very pronounced contrast between the wet and the dry seasons of Darfur and the long duration of the latter suggest a correspondingly prolonged resting period for the bulbs. According to Admiral Lynes the rainfall at Kulme during 1921—very nearly all of it fell in the four months June to September—was 725 mm. On the eastern side of the divide it was nearer 250 to 375 mm. and uncertain and local. The average maximum temperature in the dry season is about 32° C. (90° F.) with the wet bulb at 18° C. (65° F.), but during the rainy season the corresponding figures are 26.5° C. (80° F.) and 21° C. (70° F.) in bright weather and 21° C. (70° F.) and 20° C. (68° F.) when raining. The nights are cool with minima of 5°–10° C. (40°–50° F.) in the winter and about 15° C. (60° F.) in the summer.—

O.S.

Fig. 1, a leafy "stem," slightly less than $\frac{1}{2}$ nat. size; 2, bulb with the core of last year's bulb underneath, $\frac{1}{3}$ nat. size; 3, one of the top-leaves, $\frac{2}{3}$ nat. size; 4, flowering scape, nat. size; 5, a flower, nat. size; 6, a perigone-segment, $\times 4$; 7, tip of the same, $\times 20$; 8, section through the perigone-tube, $\times 2$.



WATTAKAKA SINENSIS.

China.

ASCLEPIADACEAE. Tribe TYLOPHOREAE.

WATTAKAKA, Hassk. in *Flora* XL. 99 (1857) et in *Bonplandia* VII. 267 (1859);
 Dregea, Benth. & Hook. f., *Gen. Plant.* II. 775, pro parte (1873); *Dregea* Sect.
Wattakaka, K. Sch. in *Engl. & Prantl., Nat. Pflanzenf.* IV. 2. 293 (1895).

Wattakaka sinensis, Stapf (nov. comb.); *W. corrugatae*, Stapf (nov. comb.
 e *Dregea corrugata*, Schneider) vix pro specie propria habenda consimillima,
 floribus albis rubro-maculatis et folliculis haud transverse lamellato-corrugatis
 diversa; utraque a *W. volubili*, Stapf (nov. comb. ex *Asclepiade volubili*, Linn.)
 foliorum tomento, corollae colore, coronae staminalis forma, folliculis abunde
 differt.

Frutex scandens vel pendulus, ad 3 m. altus; rami iuniores primo dense deinde
 laxius tomentelli, vetusti cortice lenticellato-verrucoso fusco tecti. *Folia*
 petiolata; lamina late cordato-ovata, acuta vel saepius acute acuminata,
 4—9·5 cm. longa, 4—7·5 cm. lata, membranacea vel chartacea, facie viridis,
 minute pubescens, dorso cinereo-velutina, 5-pli-nervia, nervis utrinque 2 vel
 3 lateralibus additis; petiolus 1·5—4 cm. longus, tomentellus. *Inflores-*
centiae specie interaxillares, umbellato-cymosae, 8—15-florae, 3—6 cm.
 diametro, pedunculo nutante 2—6 cm. longo pubescente; bracteae minutae,
 subulatae vel lineares, villosulae; pedicelli graciles, 2—2·5 cm. longi, pubes-
 centes. *Calyx* 5-fidus, pubescens, segmentis ovatis vel ovato-oblongis acutis
 2—3 mm. longis intra cum glandulis singulis alternantibus. *Corolla* in
 alabastro perfecto ovoidea, 6—7 mm. longa, deorsum visa obtuse pentagona,
 plane aperta rotata, alte 5-fida; tubus late cupularis, perbrevis, extra
 glaber, intra ore annulo prominulo marginatus et ibi pilosulus; lobi ovato-
 elliptici, obtusi, dextrorsum obtegentes, alba, varie rubro-punctati vel
 striolati, ciliolati, caeterum glabri, 5—6 mm. longi, 4 mm. lati. *Gynostegium*
 vix e tubo exsertum. *Coronae* staminalis membra area rhombica stamin-
 ibus a medio late adnata, crassa, carnosa, alba, deorsum visa ambitu ovata,
 1·5 mm. longa, apiculata, antheris incumbencia. *Antherae* connectivo
 dilatato ovato obtuso hyalino styli capiti incumbente, lobis basalibus
 cartilagineis vestibulum stigmaticum marginantibus fere ad basin gynostegii
 in alas angustas tenues ductum basi saepe poro apertum obtegentes pro-
 ductis. *Pollinia* anguste clavata, erecta, 2 mm. longa; translatore tenuis,
 pollinium versus clavato-incrassati, elastici, iis duplo breviores; retinacula
 anguste lanceolato-oblonga, 1 mm. longa. *Stylorum* caput 3 mm. altum,
 facie inferiore stigmatosa sensim in stylos abeunte. *Folliculi* patentes,
 lanceolato-fusiformes, longe acuminati, sursum incurvi, 5·5 cm. longi,
 inferne 1 cm. diametro, tenuissime pubescentes, parietibus lignoso-coriaceis
 0·5 mm. vix crassioribus, fere laeves vel saepius magis minusve transverse
 undulato-rugosi. *Semina* obovato-oblonga, 10 mm. longa, coma 2—2·5 cm.
 longa.

A climbing or pendulous *shrub*, up to 3 m. high with
 slender branches which are densely and softly downy
 when young, but ultimately become covered with a dusky
 brown and warty bark. The *leaves* borne on slender
 stalks 1·5–4 cm. long are broadly ovate from a heart-
 shaped base and acute at the often elongated tips, they
 measure 4–9·5 cm. by 4–7·5 cm. and are very minutely

and loosely hairy on the green upper side, whilst they are covered with a greyish velvety down on the back. The slender-stalked flowers are, in the number of 8-25, gathered in nodding or pendulous umbel-like downy inflorescences, 3-6 cm. in diameter and borne on peduncles 3-6 cm. long. The downy deeply 5-cleft *calyx* is 2-3 mm. long, its segments being ovate or ovate-oblong with a small solitary gland at the base close to each sinus. The *corolla* is shortly egg-shaped in the bud, and bluntly 5-angled with the segments overlapping to the right; when fully open it is star-shaped up to 1.5 cm. in diameter with a very short cup-like tube, which has a ring-like swelling at the mouth, and a deeply 5-cleft limb with oblong-elliptic blunt and minutely ciliate lobes; this limb is somewhat fleshy and white or faintly creamy with coral- or claret-red dots, partly running into small blotches and streaks. The *gynostegium* occupies almost the whole of the mouth of the corolla, exceeding it very slightly and presenting the fleshy pearly-white knob-shaped coronal appendages in a star-like arrangement, with the anthers emerging from underneath them and lying with their wide white and membranous tips on the style-head; the hardened basal lobes of the anthers whose cartilaginous edges form the fissure leading to the stigmatic vestibule descend down to the middle of the gynostegium whence they are continued almost to the base as overlapping narrow thin wings. The *pollinia* are erect in the flower, narrowly club-shaped and connected with the retinacula by slender clavate elastic translators. The *fruit* consists of 2 spindle-shaped incurved follicles, much attenuated upwards, spreading at right angles and 5.5-7 cm. long; they are thinly woody, finely downy and either almost smooth or rough from wavy transverse corrugations. The *seeds* are inversely ovate-oblong and 10 mm. long and they bear a tuft of silky hairs 2-2.5 cm. long.

DISTRIBUTION.—China, from western Hupeh along the Yangtse to Yunnan, also in western Szechuan.

Wattakaka-Kodi is the Malabar (Malayalim) name under which Rheede (publ. 1689) described and figured the plant which became subsequently known as *Asclepias*

volubilis, L.f. (1781), *Apocynum tiliaefolium*, Lam. (1783), *Hoya viridiflora*, R.Br. (1809), *Wattakaka viridiflora*, Hassk. (1857), *Dregea volubilis*, Benth. ex Hook. f. (1883) and *Marsdenia volubilis*, T. Cooke (1907). It may reasonably be considered as congeneric with the plant figured in this plate, and for whichever genus we decide, that genus will have to receive our plant. This is not the place to deal in detail with the history of the changes of opinion indicated by those names. The following must suffice. The affinity with *Asclepias* and *Apocynum* need not be discussed. *Hoya*, although in certain respects of similar structure, has coriaceous leaves, waxy flowers with valvate aestivation and, in its typical species, coronal appendages of a somewhat different shape. *Dregea*, originally based on a South African plant is by its flower, as Mr. N. E. Brown has pointed out, a *Marsdenia*, in the narrower original sense, and it is in so far incompatible with the Malabar plant. There remains therefore only *Wattakaka*. This was already recognised as a distinct group by Decaisne, who, in his monograph of the *Asclepiadaceae* in DeCandolle's *Prodromus*, created for it a section *Wattakaka* in *Hoya*, overlooking the technically important character of its contorted (not valvate) aestivation. Hasskarl, on the other hand fastened on this character and carrying the discrimination a step farther, raised Decaisne's section to generic rank, a view also shared by Miquel in his *Flora of Dutch East India*. Boerlage who more recently examined the group in its relation to *Dregea* also came to the conclusion that *Wattakaka* will have to be separated from *Dregea* as a distinct genus, although, pending a monograph of the order, he preferred to leave it, like K. Schumann, in *Dregea* as a section. With our more complete knowledge of the group, however, there seems to be no reason for maintaining this unnatural combination any longer. Although congeneric, *W. volubilis* and *W. sinensis* are by no means very closely allied and no doubt can arise as to their specific discrimination. It is otherwise with Schneider's *Dregea corrugata*, which indeed may represent merely specimens of *W. sinensis* with an excessive development of the transverse corrugations which are mostly, though in a minor degree, observable in the fruits of *W. sinensis*.

The specimen from which the plate was prepared was communicated by the Hon. Vicary Gibbs, in whose garden at Elstree it flowered last summer. He informs us that he raised it from seed collected by E. Wilson (No. 682) and given to him by Professor Sargent of the Arnold Arboretum about fifteen years ago. He grows it on a wall facing south and it has so far never suffered from frost. The flowers resemble those of a typical *Hoya*. They are very dainty and attractive though not exactly showy. In its home it frequently grows on cliffs, hanging down, the flowers making no doubt a good display. Occasionally it also trails on the ground.

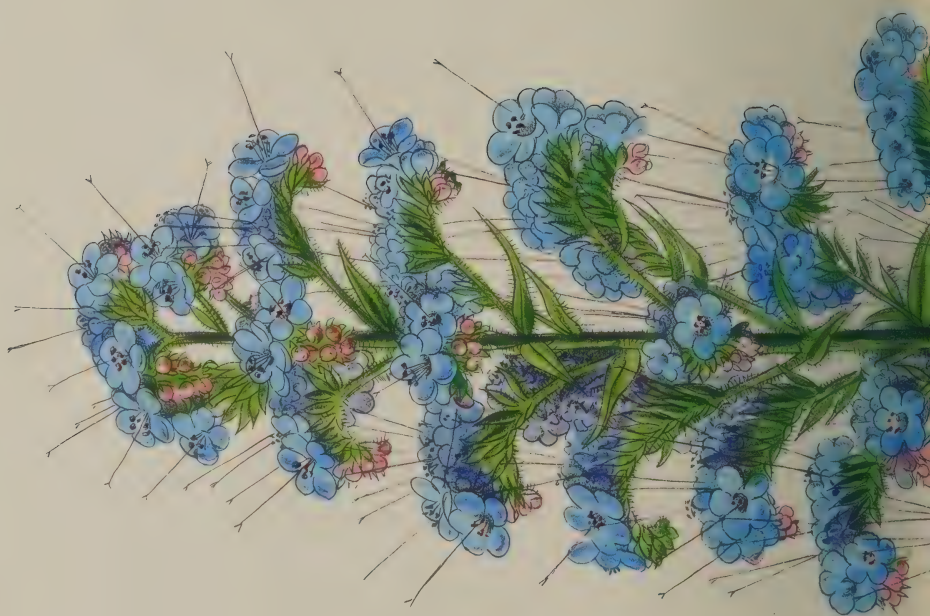
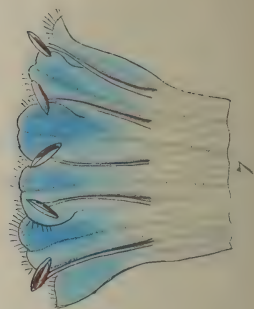
W. sinensis was discovered by Professor A. Henry in a ravine off the Ichang gorge of the Yangtse in 1887, and about the same time the Rev. E. Faber found it higher up on the river just inside the Szechuan border. Its introduction into cultivation is, however, due to E. Wilson who collected seed near Ichang in 1907. He traced the species later as far west as Mupin, whilst Camillo Schneider established its occurrence on the upper Yangtse in Yunnan at an altitude of 2400 m. In all these cases the flowers are described as white or creamy-white, variously speckled with red. Wilson, however, encountered at Maochou on the upper Min river (N.W. Szechuan) a very similar plant with "yellow" flowers and transversely lamellate fruits. This and another with the same kind of fruit, collected by von Rosthorn at Nanchuan near the junction of the Min and Yangtse, represent the plant described by Camillo Schneider as *Dregea corrugata*. Henry also noted a specimen from Patung, west of Tchong, as having yellow flowers. I can, however, find no difference as far as the dried flowering material goes, and suspect that the "yellow" observed was due to fading or the advanced condition of the flowers. To the lamellation of the fruit of *Dregea corrugata* I have already referred.

O.S.

Fig. 1, flowering branch with an immature fruit, nat. size; 2, an umbel of average size, nat. size; 3, a flower, seen from above, $\times 4$; 4, a gynostegium, $\times 3$; 5, section through a gynostegium, somewhat diagrammatic, $\times 3$; 6, a stamen seen from the back, with the coronal appendage recurved, $\times 3$; 7, the same seen from within, $\times 3$; 8, pollinia with translators and retinacula, $\times 10$.

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TAB. 8977.

ECHIUM COELESTE.

Canary Islands.

BORRAGINACEAE. Tribe ECHIEAE.

ECHIUM, *Linn.*; *Benth. & Hook. f., Gen. Plant.* II. 863; *Gürke in Engl. & Prantl, Nat. Pflanzenf.* IV. 3a. 28.

Echium coeleste, *Stapf. (sp. nov.)*; foliorum indole et florum structura *E. Webbii*, Coincy, simillimum, sed monocarpicum, caule simplici, corollae limbo fere regulari et more *Myosotidis* patente, antheris magnis distinctum.

Herba monocarpica (bi- vel triennis?), circiter 75 cm. alta; caulis simplex, erectus, basi ad 25 mm. diametro, sub anthesi ad 25 cm. foliorum vestigiis dense albo-tomentosis arcte vestitus, deinde per idem spatium dense foliatus, adpresse strigilloso-hirsutus pilis patulis additis. *Folia* inferiora deflexa, subpetiolata, ad 14 cm. longa, ad 2 cm. lata, caetera sessilia, horizontaliter patentia, sursum decrescentia, lanceolata, acute acuminata, summa vix 4 cm. longa et 0.5 cm. lata, omnia subargentea vel canescenti-virescentia, tactu mollia, facie dense dorso vero praeter nervos laxius pilis strigillosis appressis vestita, costa subtus crassiuscula, nervis perobliquis facie impressis dorso prominentibus utrinque 5 vel 6. *Inflorescentia* ambitu oblongo-lanceolata, 30 cm. longa, ad 8 cm. lata, densiuscula; rami inferiores 3 cm. vix longiores, oblique erecti, ad 3 cm. nudi, et uti rhachis eadem hirsutiae induti ac caulis foliatus nisi pilis patentibus crebrioribus et magis conspicuis; bractae ramos subpetentes foliaceae, lineari-lanceolatae, 2.5—1 cm. longae, 3—2 mm. latae, hirsutae, superiores ad flores sitae similes sed multo minores, calyces aequantes; pedicelli vix ulli. *Flores* dioici (semper?), ♀ tantum visi. *Calyx* ad basin 5-fidus, 5 mm. longus; segmenta sublinearia vel anguste lanceolata, acuta, strigoso-ciliata et insuper in dorso hirta, antica duo paulo latiora, posticum omnium angustissimum et brevissimum. *Corolla* breviter infundibuliformis, fere plane regularis, 8 mm. longa, limbo aperto patente 8—9 mm. diametro; tubus albidus, 5 mm. longus, intra ad basin parce pilosulus, caeterum glaber, annulo basali obsoleto; limbus amoene coeruleus, extra albo-pilosus, lobis subaequalibus late ovatis obtusis ciliolatis. *Stamina* hebetata; filamenta pallide purpurascencia, corollam aequantia vel paulo breviora; filamenta glabra, antica basi incrassata, in tubum protrusa et ibi membranae opera corollae affixa, lateralia fabrica simili sed minus conspicua; antherae cassae, brevissime exsertae, brunnescentes, 0.75 mm. longae. *Stylus* longe exsertus, 14 mm. longus, pilosus, breviter 2-fidus; stigmata minuta, capitata. *Nuculae* perfectae 3—1, haud contiguae, ex areola basali late transverse elliptica ambitu late ovatae, acutae, fuscae, 3 mm. longae, dorso imprimis ad latera grosse dentato-tuberculatae.

A simple-stemmed monocarpic dioecious *herb*, bi- or triennial, about 75 cm. high, whose stem is covered in the lower third with the white woolly scars of fallen leaves, but densely leafy above. The *leaves* are throughout lanceolate, acutely and long pointed, greyish-green to almost dull silvery (at least when dry) with dense stiff closely appressed hairs and with 5 to 6 very oblique nerves which are impressed on the upper face and raised

on the underside; the lower leaves are deflexed and up to 14 cm. by 2 cm., whilst the following spread horizontally and decrease upwards in size, passing into the floral leaves of the inflorescence. This is a dense oblong lanceolate very many-flowered erect *panicle*, about 30 cm. long and up to 8 cm. wide, with oblique branches bare at the base and densely and appressedly hairy; the closely approximate bracts of the branchlets are foliaceous, lanceolate and about as long as the calyces which they cover. The crowded *flowers* are nearly sessile and (always?) functionally unisexual; only a female plant having been seen, the following description covers that sex only. The *calyx* is deeply 5-cleft with narrow acute segments stiffly hairy on the edges and the back. The *corolla* is shortly funnel-shaped with a whitish tube and an almost regular widely open limb about 8 to 9 mm. in diameter and of the purest sky blue; the lobes of the limb are roundish-ovate and minutely ciliate. The *stamens* are hardly exerted and their barren brown anthers are 0.75 mm. long. The *style* is 14 mm. long and hairy. The mature *nutlets* are blackish-brown, broadly ovate, 3 mm. long and pointed with coarse sharp tubercles along their sides.

DISTRIBUTION.—Canary Islands. Palma, on the Cumbre de Garafia in the northern part of the island.

The plant portrayed in the accompanying plate was raised at Kew from seed communicated by the late Dr. V. G. Perez of Orotava who for many years devoted himself with singular enthusiasm and perseverance to the exploration of his beautiful island-home and the development of its horticultural and economic resources. Dr. Perez received the seeds from a Señor Ortega, an employee of the Forest Department of Palma, who "is fond of shooting and often goes up to the mountain summits above Garafia," a commune in the northern part of the island. The seeds were collected late in 1911 and the first of the plants raised flowered in June 1922. Unfortunately it turned out to be a purely female individual which after profuse flowering died. A fresh sowing was made last year and it is hoped that male and female plants will be obtained, if not that curious

gynomonœcius form observed by Dr. H. Hallier in *E. virescens*, a species rather closely allied to *E. Webbii*. In this the inflorescence passes first through a female stage and then produces from the last buds of the cymes a number of hermaphrodite flowers thereby ensuring fertilisation.

E. coeleste is another of the very numerous plants which in their distribution are not only confined to the Canary Islands, but within them often limited to extremely restricted areas. There are already three endemic species of *Echium* known from the island of Palma, representing very distinct types, viz., *E. Piniana*, *E. gentianoides* and *E. Webbii*. Of these *E. gentianoides*, a glabrous plant and the most distinct of all, is, like our species, known only from the high Cumbra de Garafia. All the species mentioned belong to a very natural section of *Echium*, which is almost entirely* peculiar to the Atlantic Islands and comprises a number of species remarkable on account of their stately appearance and great size. *E. coeleste* is probably the most beautiful of them. Coincy has treated the group in an able monograph in the Bulletin de l'Herbier Boissier and given it the name *Pachylepis*. Most of the species seem to be very ready to cross and several striking hybrids have been produced. In this country they have to be grown indoors, with the exception of a few favoured localities in Cornwall, but any cool and airy greenhouse would meet their requirements. In Kew *E. coeleste* has like its congeners of the *Pachylepis* section found a suitable home in the cool wings of the Temperate House.

O.S.

Fig. 1, whole plant, about $\frac{1}{4}$ nat. size ; 2, inflorescence, nat. size ; 3, a leaf, upper side, nat. size ; 4, the same seen from below ; 5, hairs from the under-side of a leaf, $\times 20$; 6, calyx, spread out, $\times 3$; 7, corolla, opened and spread out, $\times 3$.

* Of the 20 species known of that group 14 occur each in one island only, whilst three are common each to two islands. Madeira has two species (one endemic) and the Cape Verde Islands also have two. One species is recorded from Tenerife and the Spanish mainland and one from Spain only. The latter is, however, imperfectly known and its origin is not certain.

CURTIS'S BOTANICAL MAGAZINE.

CONTAINING HAND-COLOURED FIGURES, WITH DESCRIPTIONS AND OBSERVATIONS ON THE
BOTANY, HISTORY AND CULTURE, OF NEW AND RARE

PLANTS FROM THE ROYAL BOTANIC GARDENS, KEW,
AND OTHER BOTANICAL ESTABLISHMENTS AND PRIVATE GARDENS.

EDITED BY

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VOL. CXLIX. (1923).



“With tender heed,
Bringing thee chosen plants and blossoms blown
Among the distant mountains.”—*Wordsworth*.

PUBLISHED FOR

THE ROYAL HORTICULTURAL SOCIETY, LONDON,

BY

H. F. & G. WITHERBY

326, HIGH HOLBORN, LONDON. W.C.1.

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LONDON:
PRINTED AND PUBLISHED BY
MESSRS. H. F. AND G. WITHERBY,
326, HIGH HOLBORN, W.C.1.

- Part I. (tt. 8978-8989) published November 26th, 1923.
„ II. (tt. 8990-9000) „ March 3rd, 1924.
„ III. (tt. 9001-9012) „ June 16th, 1924.
„ IV. (tt. 9013-9023) „ September 22nd, 1924.

To
THE RT. HON.
[R] HERBERT EUSTACE MAXWELL, BART.,
OF MONREITH, D.C.L., LL.D., F.R.S.

DISTINGUISHED BY KNOWLEDGE AND SKILL AS
A GARDENER AND BY GRACE AND CHARM AS
A WRITER, A STAUNCH FRIEND OF HORTICULTURE
AND FORESTRY, AN INVESTIGATOR IN MANY
FIELDS, AND WITHAL A FAITHFUL SERVANT OF
THE NATION FOR LONG YEARS, THIS VOLUME IS
DEDICATED IN ADMIRATION AND GRATITUDE

BY THE

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PHYTOLACCA CLAVIGERA.

China.

PHYTOLACCACEAE. Tribe PHYTOLACCEAE.

PHYTOLACCA, Linn.; Benth. & Hook. f., Gen. Plant. III. 84; Heimerl in Engl. & Prantl, Nat. Pflanzenf. III. 1b. 11; Walter in Engl. Pflanzenr. IV. 83. 36 (1909).

Phytolacca (Subg. *Euphytolacca*) *clavigera*, W. W. Smith in Not. Bot. Gard. Edinb. X. 188 (1918); *P. americanae*, Linn., similis, sed floribus dense congestis maioribus saepe ab initio pulchre roseo-purpureis et staminum carpellorumque numero distincta; *P. polyandra*, Batalin, species nobis imperfecte nota sed e descriptione proxima, perianthii segmentis oblongis et staminum numero (16) distat.

Suffrutex ramosus, 1—1.5 m. altus, glaberrimus, ramis robustis herbaceis superne purpurascentibus. *Folia* petiolata; lamina elliptica vel ad lanceolatum vel ad oblongum vergens, acuta, basi cuneata, ad 20 cm. longa, ad 10 cm. lata, membranacea, viridis, tenuissime perlucide marginata, dorso ad costam nervosque laxè papillosa-scaberula, exsiccando raphidibus numerosis scaberula; petiolus robustus, ad 1.5 cm. longus, lamina decurrente alatus. *Racemi* erecti, densi, praeter summum maximum ad 18 cm. longum et 3 cm. crassum foliis breviores, pedunculo valido papilloso-scaberulo suffulti; bracteae anguste lineares vel tenuiter filiformes, 2 mm. longae; bracteolae similes, sed multo minores, pedicello insidentes; pedicelli basi incrassati, sub anthesi ad 5 mm. longi, demum paulo elongati. *Perianthium* segmentis aequalibus perlate ovatis obtusis vel subacutis 4 mm. longis 3 mm. latis primo albis deinde roseo-purpureis vel ex alabastro roseo-purpureis. *Stamina* 12, perianthium aequantia. *Ovarium* 8-carpellatum, carpellis omnino connatis; styli fere 2 mm. longi, suberecti. *Fructus* baccati, arcte congesti, depressi, vertice subexcavati, 9—10 mm. diametro, nigri; semina orbiculari-reniformia, 3 mm. diametro, atra, nitidissima.

P. clavigera resembles in most respects the well-known *P. americana* (*P. decandra* of many authors), but it has more compact racemes with larger perianths of a beautiful purple-rose colour which contrasts vividly with the bright green ovary. The terminal *raceme* may attain a length of as much as 18 cm. with a diameter of 3 cm. The *flowers* are 8 to 10 mm. across, the perianth-segments being very broadly ovate with blunt or slightly pointed tips. There are 12 *stamens* about as long as the perianth and 8 *carpels* which are completely united. The mature *berries* are 9 to 10 mm. in diameter and rather depressed at the top, which is slightly hollowed out; they are deep black and crowded into a dense cylindrical "spike." The juicy blackish-purple pulp encloses mostly 8 black brightly polished seeds, about 2 mm. across.

DISTRIBUTION. Yunnan, exact locality unknown.

This plant was first grown at the Royal Botanic Garden at Edinburgh from seed collected by Forrest in Yunnan in 1913. Professor W. Wright Smith, to whose courtesy we owe the specimen depicted here, informs me that it came from an odd lot of seed without any numbers or labels indicating the locality. It is grown at Edinburgh in the herbaceous border and has so far been found quite hardy. It is easily propagated from seed. According to the author's description the flowers are white on opening but turn rose-purple afterwards; but the flowers of the particular plant portrayed in this plate were already rose-coloured in the bud, the colouring becoming richer as they opened and then fading again as the ovaries began to swell out.

Walter in his monograph of the *Phytolaccaceae* enumerates three species of *Phytolacca* from China, namely *P. esculenta*, *P. acinosa* and *P. polyandra*. Of these the first two, which represent, however, probably only one species, resemble our plant very much in general appearance and particularly in the compactness of the inflorescence and infructescence, but they possess perfectly free carpels, a condition characteristic of the subgenus *Pircunia* of *Phytolacca*. On the other hand, *P. polyandra*, a native of Kansu, agrees with our plant in the structure of the ovary and also shares with it the large compact inflorescence, but its perianth-segments are oblong, measuring 6 mm. by 3.5 mm. and there are 16 stamens in the flower. It belongs, like *P. clavigera*, to the subgenus *Euphytolacca*, whose headquarters are in America (from Paraguay and Bolivia to Mexico and the eastern States of the Union). Only one other species occurs in the Old World, *P. pruinosa*, a native of Cyprus and Cilicia, and that is an aberrant type with dioecious flowers. O.S.

Fig. 1, a terminal inflorescence, nat. size; 2, part of a stem with a lateral inflorescence, nat. size; 3, a flower, $\times 5$; 4, vertical section through the base of a flower, $\times 5$; 5, cross section through the gynoeceium, $\times 6$; 6, fruits, seen from below and from above, nat. size; 7, section of a seed, $\times 6$.

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TAB. 8979.

MAXILLARIA CHRYSANTHA.

Brazil.

ORCHIDACEAE. Tribe MAXILLARIINAE.

MAXILLARIA, Ruiz & Pavon; Benth. & Hook. f., Gen. Plant. III. 555; Pfister in Engl. & Prantl, II. 6. 187.

Maxillaria chrysantha, Barb. Rodriguez, Gen. et Spec. Orchid. Nov. I. 155 (1877); a *M. marginata*, Fenzl, quacum comparanda, pseudobulbis minoribus, pedunculis foliis multo brevioribus, foliis angustioribus, labii lobo intermedio brevi distat.

Herba epiphytica, rhizomate repente cataphyllis duris pallide brunneis demum in fibras disintegratis oblecto pseudobulbos 2·5—4 cm. distantes emittente. *Pseudobulbi* oblongi, late sulcati, 4 cm. longi, ad 2 cm. diametro, basi cataphyllis scariosis lanceolatis acutis paucis suffulti. *Folia* 2-na ex apice pseudobulbi orta; lamina linearis, acuta, mucronata, basi longe in petiolum attenuata, eo incluso ad 25 cm. longa, 0·5 cm. lata, coriacea, laete viridis; petiolus 2—4 cm. longus. *Scapi* singuli ad pseudobulbi basin orti, graciles, erecti vel ascendentes, 8—10 cm. longi, pluribracteati; bracteae inferiores imbricatae, circiter 1 cm. longae, superiores duplo longiores longitudine sua ab inferioribus distantes, omnes a dorso visae lineari-lanceolatae, pallide brunneae. *Flores* solitariae, 4—4·5 cm. diametro, pedicello 2·5 cm. longo suffulti. *Receptaculum* gracile, pedicello paulo latius, 2—2·5 cm. longum, superne atro-rubens. *Mentum* lineare, 4 mm. longum, extra violaceum. *Sepala* subaequalia; summum oblongum, cuspidato-acutum, 20 mm. longum, 7—8 mm. latum; lateralia similia, sed paulo asymmetrica, sursum magis attenuata, basi lata mento adnata, ad 28 mm. longa, 10—11 mm. lata; omnia flava. *Petala* sepalis similia et concoloria, sed breviora et angustiora. *Labellum* cum basi valde contracta angulo recto mento insidens, pro maxima longitudine columnae parallelum et ei aequilongum, alto concavum vel aperte tubulosum, ore 3-lobum, a latere visum oblongum latiusculum, a fronte angustius, explanatum fere quadratum, lobis demptis 14 mm. longum, 12 mm. latum, intra ad basin pilis 3-cellularibus pubescens, callo mediano lineari apice sub ore truncato munitum, flavum, ad latera rubrovel purpureo-lineatum, extra praeter basin multo pallidius; lobi laterales breves, perlati, rotundati, violaceo-maculati, intermedius ovato-rotundatus, e basi contracta brevissime acutus, crispulus, porrectus, apice recurvus, 6 mm. longus, ochreo-flavus, papillosus. *Columna* subgracilis, circiter 14 mm. longa, 2·4 mm. lata, ambitu linearis, levissime curvata, rubra vel antice atro-rubra. *Anthera* subglobosa, rubra vel atro-rubra. *Pollinia* per paria inaequalia, ambitu ovato-rotunda, aurea. Cogniaux in Mart., Fl. Bras. III. vi. 46 (1904). *M. Galeottiana*, Regel, Ind. Sem. Hort. Petrop. 1856, 19, et in Ann. Sc. Nat. Bot. ser. 4. vi. 575 (1856), et in Gartenfl. VI. 87, 1857, et IX. 309, t. 301 (1860) et in Trans. Russ. Hort. Soc. 1860, t. 27, non A. Rich. & Gall. *M. Regeliana*, Cogn. 1. c. 47.

An epiphyte with a many-rooted slender rootstock which is covered with dry leaf-scales and produces, at intervals of 2·5 to 4 cm., oblong *pseudobulbs* each of which bears at the top a pair of more or less leathery acute grass-like leaves, measuring about 25 cm. by 0·5 cm.

The *flowers* are borne singly on slender scapes which spring from the base of the pseudobulbs and are much shorter than the leaves. They measure 4 to 4·5 cm. across the widely spreading lateral sepals and are yellow with small violet blotches on the very short lateral lobes of the *lip* and fine red lines on the inside of the concave portion of the lip whose more ochre-coloured middle lobe stands out at a right-angle with the tip recurved.

DISTRIBUTION.—Brazil ; Minas Geraës, in forests.

We are indebted for this plant to Sir Frederick Moore, late Keeper of the Royal Botanic Gardens at Glasnevin, Dublin, where it has been in cultivation under the name of *M. Galeottiana* for many years, having been purchased from Messrs. Sanders in 1891, but its earlier history is obscure. There is no doubt that it is the *M. Galeottiana* of Regel, described in the Seed Catalogue of the Botanic Garden of Petersburg for 1856 and said to have been received from Galeotti from Brazil. Cogniaux included it subsequently in his elaboration of the *Orchidaceae* in Martius, Flora Brasiliensis, and changed its name into *M. Regeliana* as the name *M. Galeottiana* had already been given to a different Mexican plant by A. Richard and Galeotti in 1845. He knew the plant only from Regel's description and contented himself with placing it next to *M. chrysantha*, a species proposed by Barbosa Rodriguez in 1877. Regel's original statement, that his *M. Galeottiana* had been received from Brazil, contained an evident mistake, as Galeotti was not in Brazil, but in Mexico and the question was, whether the error was in the name of the contributor or of the country of origin. Regel himself became evidently aware of the mistake, for in the issue of the Gartenflora of 1857 he indicated Mexico as the home of the species, without, however, referring to his earlier statement. But as there is no evidence of our plant having been found in Mexico, nor of any other species nearly related to it, whilst its identity with the Brazilian *M. chrysantha* is as certain as comparison with Barbosa Rodriguez's description and original drawing, of which there is a copy at Kew, can make it, we must assume that the original error was in ascribing it to Galeotti as the contributor.

The affinity of *M. chrysantha* lies with a number of species ranging from Brazil to the Andes of Colombia. It grows on trees and occasionally also on rocks in the southern part of Minas Geraës, on the Rio Sapucahy, the Rio Claro and in the Serra de Caldas. Barbosa Rodriguez records two varieties, var. *curtifolia* and var. *macrobulbosa*, whose characters are well expressed in the names, but apparently of little diagnostic importance. At Glasnevin *M. chrysantha* is grown in the intermediate house, where, Mr. Besant writes, it thrives satisfactorily in the usual compost, without requiring any special treatment. There is also a specimen of it at Kew which was received from Glasnevin in 1903. It is rather more robust than the one figured here and has leaves up to 40 cm. by 9 cm. *M. chrysantha* flowers freely and the sweet-scented flowers last long. O.S.

Fig. 1, a whole plant, $\frac{1}{4}$ nat. size ; 2, a pseudobulb with leaves, nat. size ; 3, a flowering scape, nat. size ; 4, lip and column, $\times 2$; 5, lip, flattened out, $\times 2$; 6, hairs from the base of the lip, $\times 130$; 7, column in front view, $\times 2$; 8, pollinia, $\times 6$.

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TAB. 8980.

VIBURNUM DAVIDII.

West China.

CAPRIFOLIACEAE. Tribe VIBURNEAE.

VIBURNUM, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 3; *Fritsch in Engl. & Prantl, Nat. Pflanzenf.* IV. 4. 163.

Viburnum (Sect. *Tinus*) *Davidii*, Franch. in *Nouv. Archiv. Mus. Paris*, sér. II. VIII, 251 (1886) et *Pl. David.* II. 69 (1888); proximum *V. cinnamomifolio*, Rehd., sed foliis magis coriaceis, inflorescentia compacta ad tertium gradum divisa, staminibus corollae lobis brevioribus, fructibus maioribus distinctum.

Frutex humilis (semper ?), ramulis crassiusculis glabris viridibus vel primo rubescentibus deinde lenticellato-verrucosis, cortice fusco-brunneo. *Gemmae* lanceolatae vel oblongo-lanceolatae, ad 7 mm. longae, perulis 2 oppositis sese applicatis glabris constitutae; perulae petiolos elaminatos dilatatos referunt, raro laminas hebetatas gerunt. *Folia* persistentia petiolata; lamina firme coriacea, oblonga vel oblongo-elliptica vel obovata, basi rotundata, rarius subacuta, apice acute acuminata, margine leviter undulata, integra vel remote denticulata, rarius argute repando-dentata, 6–13 cm. longa, 4–8 cm. lata, supra atro-viridis et lucida, subtus pallida, glaberrima vel interdum in nervorum axillis infimis albo-barbata, eximie 3-plinervia, utrinque laxe reticulato-venosa, venis facie impressis; petioli crassiusculi, glabri, purpurascens, foliorum inferiorum ad 3 cm. longi, superiorum breviores. *Inflorescentiae* terminales, corymbosae, compactae, pedunculo crassiusculo 1–3.5 cm. longo apice saltem primo albo-piloso mox glabrato suffultae; radii primarii 1–3 cm., secundarii sub fructu 6–10 mm., pedicelli 2–4 mm. longi; omnes primo magis minusve pilosuli, mox glabrescentes vel ab initio glabri, saepe rubescentes; bracteae primariae gemmam communem obtegentes ovato-oblongae, obtusae, dorso plus minusve albo-villosae, secundariae tertiariaeque lineares, 5–1 mm. longae, albo-ciliatae, omnes deciduae. *Receptaculum* cylindrico-turbinatum, uno latere leviter 2-sulcatum, 1.5 mm. altum, glabrum. *Sepala* triangulari-ovata vel oblonga, acuta vel obtusiuscula, 0.5–1 mm. longa, membranacea, glabra. *Corolla* alba, glabra, ad 5 mm. diametro, tubo lato 1 mm. alto, lobis rotundatis latis 2 mm. longis. *Stamen* filamenta crassiuscula, 2 mm. longa; antherae atro-rubrae, 0.75–1 mm. longae. *Discus* in stylum crassum 0.75 mm. altum abiens. *Stigma* sub-3-lobum. *Ovarii* loculi 3, valde inaequales, 2 minimi steriles in corpus cassum ellipsoideum coaliti, tertius demum alte descendens, intra glaber, ovulo solitario ex angulo interiore apicali pendulo corpori casso incumbente. *Fructus* ellipsoideus vel ovoideus, 5–6 mm. longus, ad 4 mm. latus, haud compressus, pericarpio coeruleo tenui, mesocarpio vix carnosulo, endocarpio tenuiter crustaceo intus laevissimo niveo; corpus cassum induratum, candidum, globoso-ellipsoideum, in fructus cavitatem ex apice protrusum, 1.75 mm. longum. *Semen* unicum, globoso-ellipsoideum, 4–4.5 mm. longum, apice ad corpus cassum recipiendum excavatum, ruminatum, brunneum, testa tenuissima. *Embryo* apicalis, ad 1 mm. longus. Wilson in Sargent, *Pl. Wilson.* I. 111 (1911); III. 429 (1917); C. Schneider, *Handb. Laubholz.* II. 652 (1911); Gard. Chron. XLIX. 317 (1911); Rehder in Sargent, *Trees and Shrubs*, II. 113 (1913); Rev. Hort. 1913, 196.

A low shrub of the *V. Tinus* group with somewhat stout glabrous branches and persistent dark green leathery

corymb, nat. size: 9, tangential longitudinal section through a fruit, $\times 6$; 10, transverse section through a fruit, $\times 6$; 11, a seed in back view, $\times 6$; 12, median longitudinal section of the same, $\times 6$; 13, embryo, $\times 20$; 14, "corpus cassum" from a ripe fruit, containing the sterile cells, $\times 20$; 15, cross-section through the same, $\times 30$.

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CANDIDEA STENOSTEGIA.

Tropical Africa.

COMPOSITAE. Tribe VERNONIEAE.

CANDIDEA, *Ten. in Atti Acc. Napol.* IV. 104, tt. 1, 2 (1839). STENGELIA, *Schulz Bip. in Flora*, XXIV. 1. *Intell.* 26 (1841; *nomen*). VERNONIA, subg. STENGELIA, *Hook. f. in Bot. Mag.* t. 5698 (1868); V. sect. STENGELIA, *Benth. & Hook. f.* II. 228 (1873); *O. Hoffm. in Engl. & Prantl, Nat. Pflanzenf.* IV. 5. 12 (1889) *pro mar. parte*.

Candidea stenostegia, *Stapf (sp. nov.)*; *C. Grantii*, *Stapf (nov. comb. e Vernonia Grantii, Oliv.) proxima*, sed phyllis angustioribus, fere omnino herbaceis, acheniis brevioribus differt; etiam *C. senegalensi*, *Ten.*, arete affinis, sed praeter phyllorum indolem capitulis minoribus manifeste distincta.

Herba perennis, ramosa, ad 45 cm. alta, caule dense breviterque incano-flavescente tomentoso. *Folia* magnitudine valde varia, maiora longe petiolata; lamina oblonga, acuta, basi cuneatim contracta et interdum longe in petiolum decurrens, margine argute dentata dentibus glandula brevi terminatis, maiorum foliorum 8—13 cm. longa, 4—5 cm. lata, supra viridis, pilis plerisque simplicibus et glandulis paucis nitentibus conspersa, infra molliter incano-pilosa et copiose glandulosa, nervis lateralibus utrinque 7—10 tenuibus; petiolus foliorum maiorum 3—4 cm. longus, gracilis, pubescens, superne lamina decurrente alatus. *Anthodia* 2—4 ad ramorum apices, pedunculata vel unum alterumve subsessile, circiter 3 cm. diametro, pedunculo incano-tomentoso ad 3.5 cm. longo suffulta; phylla 30—40, subaequilonga, linearia vel lanceolato-linear, 1.5 cm. longa, 1.5—2, rarius 3, mm. lata, exteriora fere tota herbacea nisi maturitate inferne indurata et tunc quasi appendiculata, saepe caudata, extra molliter appresse incano-tomentosa, intra in parte indurascete glabra, viridia; phylla interiora similia, nisi angustiora et intus pro maxima parte viridia glabraque, paulo indurata. *Receptaculum* planum, disciforme, 1.75 cm. diametro, glabrum, epaleatum, achaeniorum cicatricibus punctiformibus notatum. *Achaenia* anguste oboconica, matura 4 mm. longa, superne 1 mm. vix crassiora, 16—18-costulata, fulvo-hirtella. *Pappus* multisetosus; setae extimae breves, 1 mm. longae, caeterae 8—9 mm. longae, sordide barbellatae. *Corolla* primo purpureo-rosea, aperta alba et purpureo suffusa; tubus inferne ad 8—9 mm. angustissime cylindricus, fere filiformis, tunc inflatus, ellipsoideo-oblongus, parte inflato 4—5 mm. longus dentibus 1.5 mm. longis inclusis. *Antherae* 4 mm. longae, basi breviter 2-lobae. *Stigmata* lilacina, 4 mm. longa.

C. stenostegia is a perennial herb with greyish short-felted branched stems and leaves whose oblong sharply toothed blades are continued from their short wedge-shaped bases into narrow wings running down the stalks; the blades are green on the face and whitish on the back with numerous glistening glands among the soft down, and the larger of them measure 8 to 13 cm. by 4 to 5 cm. The somewhat flat flower-heads stand in clusters of 2 to 4 at the ends of the branches; they are

about 3 cm. in diameter and carry from 50 to 70 flowers on a flat bottom surrounded by an involucre of 30 to 40 linear externally greyish-downy or felted bracts of almost equal length (15 mm.). The lower part of the outer bracts becomes ultimately hardened whilst the remainder retains its herbaceous character, forming a tail-like appendage. The *corollas* are finely filiform in their lower half and much inflated in the upper half, the inflated portion being rose-purple in the bud, paling as the flowers open to a pure white slightly flushed with rose; the pink style and the filiform stigmas exceed the short corolla-teeth by 5-6 mm. The mature *achenes* are 4 mm. by 1 mm. (at the upper end), round in cross-section, finely ribbed, blackish and rough from minute hairs; their pappus consists of very numerous dirty-white shortly feathery bristles, the outer of which are 1 mm. and the remainder mostly 8 to 9 mm. long.

DISTRIBUTION.—Northern Nigeria, Nassarawa Province.

As may be seen from the synonymy quoted under *Candidea* the plant represented in the accompanying plate is, in the sense of the leading encyclopædias, a species of *Vernonia*. Four species of that genus have so far been figured in the pages of this work (see tt. 2477, 3062, 5698 and 7255), the first two being Brazilian, the others African plants. A glance at the plates cited will to some degree demonstrate the great diversity of types that have become associated in the concept of the genus. A scrutiny of any large series of species in a herbarium or of the synoptical accounts of *Vernonia* given in the literature will deepen that impression. Its heterogeneous character is also reflected by the numerous sections (16 in "Genera Plantarum") which have been proposed for the reception of the varying types included and by the great number of generic synonyms enumerated under *Vernonia* (over 40 in "Natürliche Pflanzenfamilien"). The student will further be struck by the fact that the subtribe *Eu-Vernonieae* to which *Vernonia* belongs is assumed to consist of six genera comprising nearly five hundred species and that out of them *Vernonia* alone is credited with about four hundred and fifty

species, four genera with one to three species each and one (*Piptocarpha*) with thirty. Moreover he will find on a critical analysis of the differential diagnoses and of the types which they cover that *Vernonia* is allowed an astonishing range of variety in structural detail as well as in general habit whilst the smaller genera are maintained principally on narrow characters of the same categories. It will be admitted that the classification of a large subtribe (the *Eu-Vernonieae* amount nearly to seven hundred species to-day) on a basis so unequal is not rational and cannot further the recognition of the component groups which suggest themselves to the unbiassed eye as phyla of "generic" rank. *Vernonia* is indeed at present a vague abstraction covering a chaotic multitude of forms. No doubt the need of a remedy for this condition has often been felt. J. D. Hooker himself has admitted that he "found it impossible to classify the Indian vernonias under the commonly recognised sections of the genus as defined in the 'Genera Plantarum.'" Geason has more recently worked through the North American species with some success, but no attempt has yet been made for the old-world species to build up a system more in consonance with the actual diversities of types and their distribution. For some time yet it may be unavoidable to add indiscriminately to the number of "vernonias," but whenever we have to deal with outstanding groups which in the bulk present themselves as distinct and "natural," we shall do better by breaking away from the traditional technical formulas, particularly when the ground has already been prepared for it, as in the present case.

Candidea senegalensis, the basis of the genus, was described and figured by Tenore in 1834 from plants raised at Naples from seeds collected on the Senegal by Giuglio Candida, a young Italian naturalist. Tenore expected from it a valuable addition to gardening, but the plant was lost and, although of wide range in northern Tropical Africa, it has never been reintroduced. It differs from our plant in having larger flower-heads with broad herbaceous and wavy involucreal appendages. *Candidea Grantii*, a native of eastern Tropical Africa (mainly Uganda) approaches in respect to the latter our

plant more closely, the appendages being much narrower; still they are quite distinct and often thin and long. *C. stenostegia* exhibits within the genus the minimum of differentiation in the structure of the bracts. This is carried to an extreme in the magnificent species described by Hooker as *Vernonia insignis* and *V. Calvoana* in which the appendages are petaloid and surround the delicately white and purple florets like a many-lobed snow-white corolla. In other species as *V. hymenolepis* and *V. leptolepis* the appendages are thinly membranous, erect and often very large, representing the bracts almost in their entirety. All these species are very similar in general appearance, and inhabit a continuous and naturally defined area, from the Senegal to Abyssinia and through East Africa southwards to Natal.

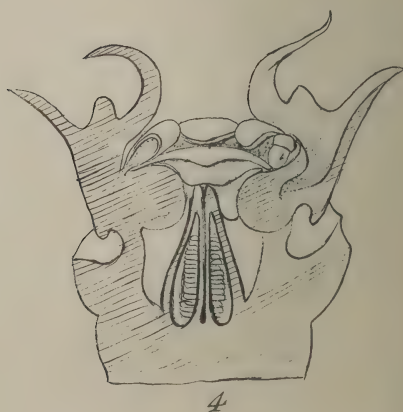
C. stenostegia was discovered by Capt. D. W. Robins, an engineering officer in the employ of the N.E. Railway Survey of Nigeria during his surveying expedition in the Narawassa Province, to the north of the lower Benue. A very similar plant, very probably representing the species in its spontaneous condition and distinguished by still narrower and velvety whitish involucre bracts was collected by Dr. Arthur W. Hill at Jos and by Mr. J. Dent Young at Vom, both in the Bauchi Plateau, Northern Nigeria, where it flowered in March and December respectively. The specimen depicted in this plate was raised in the Royal Botanic Garden at Edinburgh from seed supplied by Capt. Robins. It has flowered there for several years during the winter and seeded freely. It has to be treated as a stove-plant, but is otherwise easy to grow. O.S.

Fig. 1, upper part of a flowering plant, nat. size; 2, portion of a leaf, face view, $\times 12$; 3, the same, back view, $\times 12$; 4, section through a flower-head, nat. size; 5, outer involucre bract, back view, $\times 3$; 6, inner involucre bract, face view, $\times 3$; 7, achene with pappus, $\times 2.5$; 8, achene, $\times 6$.

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1



CARALLUMA PSEUDO-N.E.BROWNII.

South-west Africa.

ASCLEPIADACEAE. Tribe TYLOPHOREAE.

CARALLUMA, R. Br.; *Benth. et Hook. f., Gen. Plant.*; K. Schum. in *Engl. & Prantl, Nat. Pflanzenf.* IV. 2. 277.

Caralluma pseudo-N.E.Brownii,* *Dinter, Neue u. wenig bekannte Pfl. Deutsch-Südwest Afrikas*, 17, fig. 48, 49 (1914); proxima *C. N.E.Brownii*, Dint. et Berg. (*vide Bot. Mag.* t. 8267), sed humilior et corolla ferruginea luteo-variegata segmentis angustioribus distincta.

Fruticulus succulentus, caespitosus, stolonifer. *Caules* erecti vel ascendentes, quadranguli, 6—16 cm. longi, 2—3 cm. crassi, glauco-vel incano-virides, faciebz concavis vel tandem fere planis sectione transversa quadrata, angulis repando-dentatis dentibus (foliorum petiolis mutatis) pungentibus 1—2 cm. distantibus. *Folia* normalia nulla. *Inflorescentiae* umbellato-cymosae, 5—15-florae, sessiles, axillares versus caulium bases; bractee parvae, lanceolatae, initio purpurascens; pedicelli 2.5—4 cm. longi, 4—5 mm. crassi, glabri. *Sepala* lanceolata, acuta, viridia, 8—9 mm. longa. *Corolla* tubo cupulari brevi 7—9 mm. alto, limbo stellatim patente, praeter margines glaberrima, extra virescens; segmenta lanceolata, acuta marginibus recurvis, 3—4.5 cm. longa, 1.5—1.7 cm. lata, ferrugineo-purpurea, transverse rugulosa et inter rugulas varie confluentes luteo-maculata, ad margines pilos pendulos clavigeros atro-purpureos ad 6 mm. longos gerentia. *Corona* exterior patellari-cupularis, purpureo-nigra, 9—10 mm. diametro, segmentis late trapezoides ad medium connatis 3 mm. longis, margine exteriori inaequaliter minute late dentato; interior eodem colore, cornuta, cornibus a latere compressis recurvis vix 4 mm. longis basi dente dorsali auctis. *Antherae* connectivi appendice late triangulari. *Pollinia* sub-hemisphaerica, 0.5 mm. lata, aurea; translatorez breves, vix 0.2 mm. longi; retinacula oblonga, 0.18 mm. longa. Dinter in Fedde, Repert., Beihefte III. 29, 108 (1921).

C. pseudo-N.E.Brownii forms low clusters, often of considerable dimensions, of greyish- or bluish-green glabrous 4-angled *stems*, with sharply pointed distant teeth along the angles and concave or, in old specimens, flat faces between them. The *flowers* are produced in large 5-15-flowered convex umbel-like inflorescences from near the base of the stems with the lanceolate segments of the corollas often interlocked. The limb of the *corolla* is 7-11 cm. wide and dark rust-coloured, with fine short transverse wrinkles and yellow lines and dots

* I have attempted to assure the correct pronunciation of the compound usually spelled "*Nebrownii*," namely, *N.E.Brownii*," by treating the first two letters as initials, the species being dedicated to Mr. N. E. Brown, and not to a man of the name Nebrown. It would be altogether better to avoid combinations of that kind.

between them in the lower half of the segments which bear along the margins long purple club-tipped pendulous and very mobile hairs. The mouth of the short cup-shaped tube is practically closed by the *outer corona* whose flat broad truncate segments are so arranged as to form a shallow cup or saucer up to 1 cm. across, while the *inner corona* consists of five dorsal staminal crests, each with a small tooth at the base and a recurved horn at the other end.

DISTRIBUTION.—Great Namaqualand, common in the central and southern parts, as at Aus, Keetmanshoop and Warmbad.

This elegant plant very much resembles *C. N.E.Brownii*, which (see Bot. Mag. t. 8267) differs mainly in the uniformly blackish-brown flowers, their rather broader corolla-segments and the generally more robust growth. According to Dinter the two species exclude each other in their distribution, *C. N.E.Brownii* being a native of Herero and Ovamboland (19° to 22° S.), whilst our plant inhabits the southern parts of the territory of South-west Africa from the latitude of Lüderitzbucht to near the Orange river. Herr Kurt Dinter discovered it in 1910 in the Mesembrianthemum-steppe of Aus where it grew copiously along with other succulents in the shelter of *Mesembrianthemum spinescens*, the dominant element of the vegetation. According to him it is common on the plateau of Kanus between the Great Karasberg and Warmbad. The specimen from which the plate was drawn was kindly communicated by Mr. Elwes, with whom it flowered in July of last year. He presented it subsequently to Kew where it is grown with other South African succulents. It shows at present (June) the first signs of flowering in the shape of clusters of small purplish bracts in the axils of the lower teeth of some of the stems. *C. N.E.Brownii* and *C. pseudo-N.E.Brownii* belong to a small group of South African species of uniform habit and characterized by the peculiar formation of the corona described above. O.S.

Fig. 1, a whole plant, nat. size; 2, pedicel with calyx, nat. size; 3, corona, $\times 4$; 4, longitudinal section of the sexual apparatus, $\times 5$; 5, pollinia, $\times 20$.

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RHODODENDRON THAYERIANUM.

China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, *Linn.*; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron Thayerianum, *Rehder & Wilson in Sargent, Pl. Wilson.* I. 528 (1913); cum *R. longipedi*, *Rehder & Wilson*, comparandum, perulis diu persistentibus, foliis angustis, floribus minoribus, pistillo omnino glanduloso distinctum.

Frutex 3—4 m. altus, novellis omnibus magis minusve araneoso-villosis viscosisque; rami primo cinereo-virescentes et floccoso-variegati, deinde atro-virides, tandem fusci et glabrati, ad incrementorum annuorum summitates dense foliati, caeterum perulis gemmae intimis dissitis diu persistentibus muniti vel nudi. *Gemmae* elongato-ovoideae, ad 2 cm. longae; perulae exteriores coriaceae, oblongae, mucronato-apiculatae vel obtusae, 1—2 cm. longae, exsiccando fuscae vel alutaceae, saepe per plures annos persistentes; intimae in ramo accreto dissitae, oblanceolatae, basi longe attenuatae, 2—2.5 cm. longae, papyraceae, alutaceo-aurantiicae, villosulae vel glabratae et vernicosae. *Folia* 10—20 ad incrementorum summitates congesta, oblique patentia, rigida; laminae angustae, oblanceolatae, acutae, basi longe attenuatae, facie ad costam anguste sulcatae, ad margines late recurvae, maiores ad 15 cm. longae, ad 2.5 vel 3 cm. latae, coriaceae, novellae utrinque araneoso-villosae, facie mox glabratae et tunc atro-virides, dorso tandem ob villum collapsum et in stratum tenuissimum conglutinatum pallide aetheneae vel subargenteae, indumento e pilis fasciculatis tenuissimis intertextis et glandulis stipitatis clavatis multicellularibus intermixtis constituto, costa dorso valde prominente, nervis utrinque 10—12 tenuibus. *Inflorescentiae* gemma oblonga, 2.5—3 cm. longa; perulae exteriores late ovatae, mucronato-apiculatae, 1.2—1.5 cm. longae, 8 mm. latae, caeterum perulis gemmarum foliorum similes, intimae tandem in pedunculo brevi dissitae, oblongae, dorso sericeae, ad 2.5 cm. longae. *Flores* 10—12 in rhachi gracili ad 10 cm. longa siti; bractaeae pedicellos subpentes lineares, dense pilosae, ad 8 mm. longae; pedicelli graciles, villosuli viscosique, 3—5 cm. longi. *Calyx* cupularis, 3—5 mm. longus, glanduloso-viscosus, lobis valde inaequalibus rotundatis virilibus nisi ad margines purpurascens. *Corolla* late infundibuliformis, 5-lobata, 2.5—3 cm. longa et ore 3—3.5 cm. diametro, extra amoene rosea, intra pallida vel tandem fere alba, in fundo postico rubro-punctata, glabra; lobi rotundati, 1.2 cm. longi, anteriores 2 paulo angustiores. *Stamina* 8—10; filamenta basin versus dilatata et minute pilosa, 15—18 mm. longa; antherae vix 2 mm. longae. *Discus* crasse annularis, lobulatus. *Ovarium* oblongum, viride, uti stylus corollam paulo excedens, multi-glandulosum; stigma applanato-discoideum. *Capsula* cylindrica vel subclavata, 2—3 cm. longa, ad 6 mm. diametro, 6—8-locularis, glandulosa, valvis angustis recurvis. *Semina* ellipsoideo-oblonga, utrinque alato-cristata, 3—4 mm. longa, pallide brunnea.

This *shrub* grows in its home to a height of 3 to 4 m.; it has somewhat stout branches bearing 10 to 20 crowded leaves at the upper end of each year's growth and a cluster of old outer bud-scales at the base, the inner long and narrow orange-tawny bud-scales dropping tardily during

the first year. The *leaves* are at first densely covered with a whitish cobwebby felt on both sides which as they unfold disappears gradually on the upper side but persists on the back, collapsing and becoming matted into a fine pale bronzy film; like all young parts they are at first more or less sticky; when full-grown they are inversely lanceolate, pointed, long-tapering to the base, grooved along the midrib with arching sides and recurved margins, the longer measuring up to 15 cm. by 2.5 cm. The *flowers* form loose bunches of up to 12 at the ends of the branches; the slender common stalk is about 10 cm. long and carries the slowly shed bud-scales at the base of the bunch; the special stalks are 3 to 5 cm. long; the stalks, scales and calyces are more or less sticky. The *calyx* is very unequally 5-cleft with rounded lobes, the longest up to over 2 mm. long. The *corolla* is widely funnel-shaped, 2.5 cm. by 3 to 3.5 cm. (at the mouth), quite glabrous, rose-red on the outside, pale or at length almost white inside with numerous red dots on the back of the throat; the lobes are almost equal, rounded and about 1.2 cm. long. There are 8 to 10 stamens with the filaments finely hairy below the middle. The green *pistil* is glandular all over, the style emerging shortly from the corolla. The *capsules* are more or less cylindric and measure 2 to 3 cm. by 6 mm.; they open by 6 to 8 narrow recurving valves. The seeds are 3 to 4 mm. long with a rounded crest at each end.

DISTRIBUTION. Western Szechuan, neighbourhood of Mupin.

This charming rhododendron was contributed by Mr. J. C. Williams of Caerhays Castle, Goran, Cornwall, where it flowered in the early part of July of last year. It appears to be quite hardy in this country, and according to Mr. Williams seems to bear exposure to wind better than most species with good-sized leaves. It has also seeded freely with him. Its native habitat is in the woodlands around Mupin at about 3,000 m. There Mr. E. H. Wilson discovered it in 1910.

R. Thayerianum belongs to a group of Szechuan species of which two have been figured in earlier issues

of the Botanical Magazine, namely *R. argyrophyllum* (t. 8767), one of the commonest species of the genus in Szechuan, and *R. hypoglaucum* (t. 8649). Both species have been in cultivation in this country for some time. Apart from the colour and size of the flowers and other floral characters our plant differs from them very markedly in its narrow stiffly spreading leaves and the clusters of bud-scales which persist at the base of the year's growth for several years. This is altogether an outstanding character which renders our species easily recognisable. *R. longipes* is another species of this group. Rehder and Wilson have contrasted it especially with *R. Thayerianum*, but *R. longipes* too has broader leaves, deciduous perules and an eglandular ovary. The name "*Thayerianum*" was chosen by the authors to commemorate the generous interest which the Thayer family of Lancaster, Massachusetts, have taken in horticulture and the botanical exploration of China. O.S.

Fig. 1, a flowering branch, nat. size; 2, bract at the base of a pedicel, $\times 8$; 3, a stamen, $\times 5$; 4, a flower with the corolla removed, $\times 3$; 5, a capsule, nat. size; 6, a seed, $\times 6$.

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TURRAEA FLORIBUNDA.

Africa.

MELIACEAE. Tribe MELIEAE.

TURRAEA, Linn.; Benth. & Hook. f., *Gen. Plant.* I. 331; C. DC. in DC., *Mon. Phan.* I. 435; Harms in Engl. & Prantl, *Nat. Pflanzenf.*, III. 4. 282.

Turraea floribunda, Hochst. in *Flora*, XXVII. 297 (1844); species bene distincta cum *T. Kaessneri*, E. G. Baker, comparanda, sed floribus triplo minoribus.

Frutex vel *arbuscula*, ramis novellis flavido-pubescentibus tandem glabratis et cortice laevi atrofusco tectis. *Folia* decidua, petiolata; lamina ovata vel elliptico-ovata, acute acuminata, basi rotundata vel breviter cuneata, 5—8 cm. longa, 2—4.5 cm. lata, membranacea, in gemma facie subvelutina, dorso tomentosa, evoluta hirsuta pilis ibi admodum dissitis hic ad costam nervosque restrictis, nervis utrinque circiter 7 tenuibus; petiolus 6—10 mm. longus, dense pubescens. *Flores* suaveolentes, plerumque 2 vel 3 in brachycladiis efoliatis multibracteatis 5—10 mm. longis; bracteae squamiformes, ovatae vel lanceolatae, ad 2 mm. longae, sericeo-tomentosae, inferiores et summae steriles; pedicelli superne incrassati, 8—10 mm. longi, dense pubescentes. *Calyx* cupularis, 3—4 mm. longus, 5-dentatus dentibus triangularibus, sericeo-tomentosus. *Corolla* in alabastro perfecto 3—3.5 cm. longa; petala linearia, superne spatulato-dilatata et 3 mm. lata, pallide flavo-viridia, in dorso ad apicem sericeo-pubescentia, et secus nervum medium magis minusve hirsuta. *Staminum* 10 tubus gracilis, niveus, 2.5 cm. longus, apice 20-lobatus lobis linearibus 3 mm. longis reflexis; filamenta paulo sub loborum ortum inserta, brevissima; antherae oblongae, cuspidatae, vix 1 mm. longae. *Discus* cupularis, luteolus. *Ovarium* 10-loculare, glabrum, loculis 2-ovulatis; ovula superposita; stylus 3.5—4 cm. longus; stigma depresso-capitatum, umbonatum. *Fructus* capsularis, ligneus, depresso-globosus, leviter 10-lobatus, 2—2.5 cm. diametro, siccio fuscus, valvis 4—7 fere 2 mm. crassis apertus. *Semina* reniformia, nigra, 6 mm. longa, e hilo quasi arillata. C. DC. in DC., *Mon. Phan.* I. 43 (1878); Harms in Engl. & Prantl, *Nat. Pflanzenf.* III. 4. 285. *T. heterophylla*, Sonder in Harvey & Sonder, *Fl. Cap.* I. 245 (1860); M. Wood, *Natal Plants*, III. t. 246 (1900), non DC.

A deciduous *shrub* or small *tree* with downy twigs which grow into glabrous smooth-barked branches. The *leaf-blades* are membranous or at length papery, more or less ovate from a rounded base and produced into a generally acute point, 5 to 8 cm. by 2 to 4.5 cm., and hairy on both sides (finely and loosely on the face and more coarsely on the back, particularly on the nerves); they are borne on slender downy stalks, 6 to 10 mm. long. The pale yellowish-green sweet-scented *flowers* are produced (mostly 2 or 3) on short scaly leafless spurs and are carried on densely downy stalks 8 to 10 mm. long. The silky *calyx* is cup-shaped,

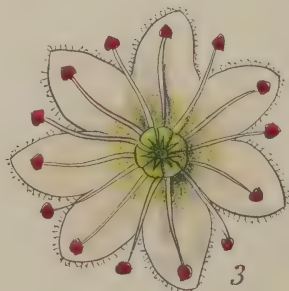
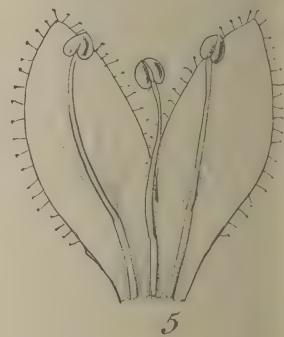
of the two great Floras of the African Continent. In spite of the increase of the species that have thus become known the genus has remained remarkably uniform as far as floral structure is concerned. On the other hand the diversity in the structure of the fruits which was already evident among the species first described has become more accentuated and may in the future lead to a more natural grouping of the species ; for instance, all the Indo-Malayan species of which the fruit is known follow the "*Euonymus*" type, i.e., thin-walled capsules splitting to the base with finally revolute valves.

T. floribunda has long been confused with *T. heterophylla*, a species of Upper Guinea and first known from the Gold Coast. The latter has very characteristic leaves, often angularly lobed, and it is difficult to understand how the error arose. The name *Turraea* commemorates Antonio Turra, Professor in the university of Vicenza and author of a paper on *Farsetia* (1768) and a "*Prodromus*" of a Flora of Italy, a mere list of names, which he presented to the Academy of Siena in the same year, but which was printed only in 1780. O.S.

Fig. 1, a flowering branch, nat. size ; 2, part of a flower in longitudinal section to show the staminal tube and the pistil, $\times 2$; 3, part of the staminal tube with the lobes flattened out, $\times 3$; 4, an anther, $\times 15$; 5, base of the pistil with disc, $\times 8$; 6, section through ovary, $\times 12$; 7, a fruit, nat. size (from a dried specimen, Wood 768) ; 8, a seed, $\times 5$ (from the fruit shown in fig. 7).

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TAB. 8985.

SEMPERVIVELLA ALBA.

India.

CRASSULACEAE.

Sempervivella, Stapf (gen. nov.); affinis *Rosulariae*. Stapf (generi novo cum *Umbilici* sectione *Rosularia*, D.C., congruo), floribus 6—8-meris, corollae tubo brevi, limbo anthesi summa patente; a *Sempervivo*, Linn., distat imprimis corolla altius gamopetala, tubo acute 6—8-angulato.

Flores 6—8-meri. *Sepala* carnosae. *Corolla* gamopetala, tubo brevi vel brevissimo cupulari 6—8-angulari, segmentis patentibus. *Stamina* aliarum partium numero duplo, filamentis corollae adnatis, epispalis ad tubi ostium, epipetalis altius. *Squamae* hypogynae tot quot corollae segmenta. *Carpella* libera, centro angusto spatio distantia, multi-ovulata, matura erecta, introrsum dehiscentia. *Semina* cylindrica.—Herbae Himalaeae perennes, soboliferae, rosulantes, foliis carnosiss sessilibus, caulibus floriferis e rosula lateraliter ortis ascendentibus vel prostratis, floribus cymosis albis.

Sempervivella alba, Stapf (comb. nov. e *Sempervivo albo*, Edgew.); a *S. sedoidi*, Stapf (comb. nov. e *Sempervivo sedoidi*, Decne in Jacqem.) proxima habitu magis robusto, foliis latioribus, corollae segmentis ovato-oblongis et tubo duplo longiore distat.

Herba perennis, copiose sobolifera, rosulis 2·5—3 cm. diametro, omnibus partibus glanduloso-pilosa; caules floriferi ascendentes vel prostrati, ad 6 cm. longi. *Folia* rosularum dense congesta, obovato-oblonga, obtusa vel obtusissima, ad 1·5 cm. longa et 3—6 mm. lata, facie fere plana, dorso leviter convexa, viridia vel superne saepe pulchre rubescentia; caulina simillima nisi potius elliptico-oblonga, laxiuscula. *Inflorescentiae* plerumque 6—8-florae, contractae, rarius cymis longiuscule pedunculatis 2—1-floris e foliorum inferiorum axillis ortis auctae; bracteae folia diminuta referentes; pedicelli tandem 5—8 mm. longi. *Flores* 6—8-meri, 12—14 mm. diametro. *Calyx* depressio-hemisphaericus, 6 mm. diametro; sepala lineari-oblonga, magis minusve obtusa, crassa, ad 5 mm. longa, ad 2 mm. lata. *Corolla* alba, in alabastro apice rubra; tubus late cupularis, 6—8-angularis, 2·5—2·75 mm. longus; segmenta summa anthesi stellatim patentia, anthesi peracta erecta, ovato-oblonga, subobtusa vel minute apiculata, dorso carinata, facie basi sulcata, 5—5·5 mm. longa, 4 mm. lata, extra et ad margines glanduloso-pilulosa. *Stamina* 12—16; filamenta glabra, epispala quam epipetala breviora, haec ad 4 mm. adnata; antherae rubrae, 0·75 mm. longae. *Glandulae* hypogynae crassae, cuneatae, introrsum oblique truncatae, 1 mm. longae, aureae. *Carpella* a latere oblan-ceolata, paulo curvata, subacuta, 4·5 mm. longa, centro paulo distantia, glanduloso-pilosula; styli praeter basin glabri, 1·5—2 mm. longi, apice leviter recurvi; stigmata minuta, truncato-capitata. *Folliculi* maturi introrsum dehiscentes. *Semina* cylindrica, 1 mm. paulo longiora. *Sempervivum album*, Edgeworth in Trans. Linn. Soc. XX. 50 (1846); Hook. f. and Thoms. in Journ. Linn. Soc. II. 93 (1858). *S. sedoides*, C. B. Clarke in Hook. f., Fl. Brit. India II. 423 (1878), pro parte; Collett, Fl. Siml. 186 (1902) non Decne in Jacquem.

S. alba is a low rosulate herb, covered all over with small gland-tipped hairs. The rosettes are 2·5 to 3 cm. in diameter and formed of fleshy flat blunt broad-oblong leaves, which widen slightly towards the tips and measure

terised by the possession of 6-8-merous flowers with short cup-shaped corolla-tubes and spreading corolla-limbs, and for this I propose the name *Sempervivella*. I decided on that step only after having worked over the whole of the crassulaceous genera of the northern section of the Old World. The need of smaller and more "natural" genera in *Crassulaceæ* as in other families where the one-sided adherence to traditional technical characters has led to the formation of perfectly unwieldy groups has often been felt. Witness thereof the numerous segregates which have from time to time been proposed by botanists who were more concerned in the empiric conception of diversities than in their logical classification under rigid schemata. Such natural genera, that is genera with a tolerably uniform facies as well as floral structure and at the same time with a range suggestive of a continuous common history of their members, will be more concrete and therefore easier to grasp and remember than highly abstract concepts which, as our knowledge of forms progresses, are bound to lose more and more of their connotations and in that measure become more vague and meaningless. The plea that such segregates are often imperfectly definable because connected by intermediates need not deter us. That is in the nature of things and detracts as little from the reality of those empirically conceived genera as the presence of connecting spurs and bases deprives practically recognised mountain ranges, mountains or tablelands of their individuality.

S. alba was grown by Mr. Elwes in a pot and kept over the winter in a cold frame. It is treated in the same way at Kew, where it was transferred by its owner. It is at present (middle of August) coming into flower. It produces runners very freely and also seeds well, so that its propagation is of the simplest. If it should be found hardy, as is probably the case, it would recommend itself very much by the contrast of its colours for rock gardens with a sunny exposure. O.S.

Fig. 1, whole plant, nat. size; 2, flower in side view, $\times 2$; 3, the same seen from above; 4, diagram of a flower (in the description of the diagram the designations "inn. st." and "out. st.," that is stamens of inner whorl and stamens of outer whorl have inadvertently been transposed); 5, part of corolla, seen from within, $\times 4$; 6 and 7, hypogynous glands in face- and in side-view, $\times 10$; 8, a carpel, $\times 6$.

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TAB. 8986.

PRIMULA CALCIPHILA.

China.

PRIMULACEAE. Tribe PRIMULEAE.

PRIMULA, Linn.; Benth. & Hook. f., Gen. Plant, II. 631; Pax in Engl. & Prantl, Nat. Pflanzenf. IV. 1. 104.

Primula calciphila, Hutchinson in Kew Bull., 1923, 97-102, t. 1; a *P. sinensi* quacum olim confusa indumento omnium partium brevior minusque conspicuo et calice e basi truncata late conico distincta; a *P. rupestri*, Balf. f. & Farrer, simillima calycis lobis paulo brevioribus latioribus et corollae lobis plerumque minus alte lobulatis vel emarginatis vel subintegris differre dicitur (vide infra).

Herba perennis, undique breviter glanduloso-pilosa. *Caulis* hypogaeus, parce ramosus, petiolis relictis induratis vel eorum basibus dilatatis crebris obtectus. *Folia* numerosa, basi congesta; lamina ambitu late rotundata, pinnatis 5-7-lobata, 3-5 cm. longa, 3-4 cm. lata, lobis late oblongis vel rotundatis grosse crenato-dentatis, nervis lateralibus facie leviter impressis dorso prominentibus; petioli ad 10 cm. longi, basi dilatati, ad latera scariosi et longe ciliati, superne subteretes, haud alte canaliculati. *Inflorescentia* umbellata, 6-14-flora, ad 10 cm. diametro, interdum verticillo inferiore aucta, pedunculo ad 15 cm. longo suffulta; bractae lineares vel lineari-lanceolatae, 1 cm. longae, virides; pedicelli admodum inaequales, ad 4 cm. longi. *Calyx* e basi truncata concava late conicus, 1-1.5 cm. longus latusque; lobi tubo breviores, triangulari-vel oblongo-lanceolati, 3-4 mm. longi, basi 1.75-2.5 mm. lati. *Corolla* 3.5 cm. diametro, pallide lilacina vel roseo-lilacina, ostio viridi-flavo; tubus cylindricus, in forma brevistyla 13-15 mm. longus et per 9-10 mm. a basi angustus, in forma longistyla paulo brevior et parte angusta 4-5 mm. longa, deinde ampliatus; limbus 5- (rarius 4-) lobatus, lobis breviter 2-lobulatis vel emarginatis vel in forma longistyla interdum integris obovatis 1.5 cm. longis 1 cm. latis, ostium versus glanduloso-pilosulis. *Stamina* in forma brevistyla circiter 16 mm., in longistyla 6 mm. supra basin inserta; antherae 3 mm. longae, flavidae. *Stylus* 4 vel 7 mm. longus. *Capsula* ovoideo-globosa, 6 mm. diametro, calyce paulo brevior, valvis late triangularibus aristulatis. *Semina* globosa, 1.5 mm. diametro. *Primula sinensis*, Franch. in Bull. Soc. Bot. Fr. XXXIII. 65 (1886); Hemsl. and Forbes in Journ. Linn. Soc. XXVI. 42 (1889); Masters in Gard. Chron. V. 115 (1889) et VIII. 564 (1890), et XI. 12, fig. 2 (1892); Hook. f. Bot. Mag., t. 7559 (1897); A. Henry in Gard. Chron. XXXI. 269, fig. 84, 85 (1902); Pax in Engl. Pflanzenr. Primul. XXI partly (1905); E. H. Wilson in Gard. Chron. XL. 191, fig. 78 (1906), non Sabine ex Lindl.

This is a perennial *herb* with the habit of *P. sinensis*, with a very short sparingly branched somewhat woody stem which is covered by the indurated bases of the leaf-stalks and becomes more or less buried in the ground, bearing a crown of long-stalked broadly ovate or rounded and pinnately 5- to 7-lobed *leaves* which like all the parts of the plant are softly downy with short gland-tipped hairs and measure 3-5 cm. by 3-4 cm.

The *flowers* are arranged in 6-8- or sometimes up to 14-flowered umbels and borne on slender stalks of very unequal length (up to 4 cm.); they are either of the thrum- or the pin-eyed form. The *calyx* is about 1-1.5 cm. high and broadly conical from a truncate base with lanceolate lobes 3 to 4 mm. long. The *corolla* is about 3.5 cm. across with inversely heart-shaped, or in the pin-eyed form, sometimes entire lobes; it is pale lilac, often verging to pink, and glabrous on the inside with the exception of some minute glands towards the mouth.

DISTRIBUTION.—Hupeh, on rocks in the gorges of the Yangtse near Ichang.

In 1897 Sir J. D. Hooker published in the Botanical Magazine (t. 7759) the figure of a primula which he considered to be the wild state of the Chinese primula of gardens, a form so far unknown. The original of the picture came from the garden of a Mr. Hyde at Ealing. Mr. Hyde had it from Dr. Masters who had found it in a batch of seedlings raised by Lady Hutt of Appleby Towers, Ryde, from seeds sent to her by Mr. Pratt from Ichang. The figure is in complete agreement with a pen-and-ink drawing of a plant of the same origin published a few years previously by Masters in the Gardeners' Chronicle of 1892 (vol. xi.) except for the hairiness of the corolla-lobes which are shown glabrous in Masters' figure. Neither figure differed sufficiently from *P. sinensis* to arouse doubt at that time, and as Hance on the strength of specimens collected by Watter near Ichang—these have meanwhile been shown to be *P. obconica*—and Franchet from others collected by Delavay in the same locality had claimed the neighbourhood of Ichang as the home of *P. sinensis*, the identification involved remained all but undisputed. Even when in 1918 Sir I. Bayley Balfour and R. Farrer described *P. rupestris* (Farrer, Nov., 1914) which they recognised as very closely connected with the Ichang plant they accepted the latter as the wild state of *P. sinensis*. Still doubt had arisen as to the specific identity of the Ichang plant and the *P. sinensis* of cultivation. This was inevitable after Wilson, who was familiar with the former in its native habitat, had (1906) pointed out the great divergence between it

and the florist's flower which in his opinion had changed so much "that the only thing that had remained constant is the perfume." To-day it is clear that the relations of the two plants are those of species nearly allied but distinct in their morphological characters as well as in their distribution, *P. sinensis* being a more southern type. Mr. J. Hutchinson in a valuable paper in the Kew Bulletin for the present year (pp. 79-102) has emphasized this discrimination and carried it to its logical conclusion, and accepting Balfour and Farrer's treatment of the Ichang plant as distinct from *P. rupestris*, he has given it a name of its own, *P. calciphila*. To me, the distinctiveness of *P. calciphila* as compared with *P. rupestris* is very doubtful, but as the latter has been lost in gardens and I have only dried cultivated specimens and drawings to rely upon I feel some hesitation in reducing *P. calciphila* to *P. rupestris*; but so much may be said that the characters adduced for the discrimination of the two species, come entirely within the range of fluctuation observable in the ample material of *P. calciphila* which I have been able to examine. Nor would the occurrence of *P. rupestris* in the Ichang gorges be surprising. These gorges lie at the eastern end of the Ta pa shan. Farrer collected the seed from which *P. rupestris* was raised in the north-western continuation of the same chain of mountains* under ecological conditions similar to those prevailing at Ichang, and he says that he has no doubt that it pervades all the smaller ranges of the Ta pa shan at an altitude of 1,800-2,100 m.† This higher altitude might indeed suggest, as Farrer thought, a hardier race which could withstand the relative severity of our climate, whilst the Ichang plant is generally considered as too tender and with us is treated like *P. sinensis* as a greenhouse plant. But if we consider the conditions under which *P. calciphila* lives in its home, it should not be impossible to grow it

* In the Kia Ling Kiang valley, from the Shensi-Szechuan frontier to where the river enters the Red Basin, that is the red sandstone area, of Szechuan.

† The altitudes given by Farrer are evidently much exaggerated. The section of the Kia Ling Kiang valley concerned descends roughly from 600 to 300 m., with the bordering hills rising apparently on neither side to more than 1,200 m. The altitude of Ichang is about 90 m. above the sea, with the cliffs of the gorge towering to 600 m.

out of doors in sheltered and sufficiently dry positions where it is free from the danger of damping off during the winter. Henry describes the habitat of the primula thus—"The habitat and mode of growth is remarkable, different from what we find in the cultivated forms (meaning *P. sinensis*). The wild plant grows on the ledges of rocky cliffs of limestone, in spots where there is no soil, and practically no moisture, exposed to the sun, and living amidst the decaying remains of former generations of the plants. These ledges of primula are often continuous for hundreds of feet, and in December and January, when the flowers appear, present a scene of great beauty." To this may be added that at Ichang, December to March are the driest months of the year, with a monthly rainfall of 15 (Dec.) to 51 mm. (March), and that whilst the January mean lies between 3° and 4° C., the annual minima of temperature are fluctuating around -5° C.

The plant from which the present plate was prepared was one of a batch raised from seed communicated by Miss Willmott after the original stock from Hance's introduction had been lost. Miss Willmott's plants which produced the seed were of Wilson's collection of 1906.

The renewed inclusion of this plant in the Botanical Magazine (t. 7559 under *P. sinensis* and the present plate) will be understood if the two plates are compared. They suggest different strains if not different species, but a photograph of a plant of the same stock as that of the earlier plate, taken by Messrs. Sutton in 1898, tallies exactly with Wilson's plant and one can only conclude that the differences exhibited by the figures are essentially due to circumstances connected with the preparation and the reproduction of the first plate. Unfortunately neither the specimen from which this was drawn nor another of the same stock was preserved. O.S.

Fig. 1, a whole plant (nat. size); 2, longitudinal section of a pin-eyed flower with the corolla limb cut off, $\times 2$; 3, same of a thrum-eyed flower, $\times 2$; 4, corolla-limb (pin-eyed form), nat. size; 5, anthers, $\times 3$.

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TECOPHILAEA CYANOCROCUS.

Chile.

AMARYLLIDACEAE. Tribe CONANTHEREAE.

TECOPHILAEA,* *Bert. ex Colla*; *Benth. & Hook. f., Gen. Plant.* III, 680; *Pax in Engl. & Prantl, Nat. Pflanzenf.* II, 5, 122.

Tecophilaea cyanocrocus, *Leyb. in Bonplandia*, X, 370 (1862) et *in Seemann's Journ. Bot.* I, 11 (1863); ab altera generis specie, *T. violiflora*, *Bert.*, foliis 2-nis vel 3-nis et flore multo maiore distinctissima.

Herba glaberrima, e cormo perennans. *Cormus* subterraneus, discoideus, 1—1.3 cm. diametro, 4 mm. altus, hornotinus annotino collapsio insidens, dense fibroso-tunicatus. *Scapus* gracilis, simplex vel ubi solo egreditur divisus et tunc 2- vel 3-florus, parte subterranea 5—8 cm. longa foliorum vaginis arcte inclusa. *Folia* basalia plerumque 3, extimum ad vaginam tenuiter membranaceam praeter apicem virescentem albidam reductum, caetera perfecta; lamina linearis vel lineari-lanceolata, acuta, canaliculato-concava vel magis minusve explicata, ad margines saepe undulata, erecta vel potius curvata, 7.5—12 cm. longa, ad 8 mm. lata, saturate viridis; folia caulina vel bracteae tot quot pedicelli, eos (3—5 cm. longos) paulo superantia, laminis angustis. *Perigonium* cyaneum, varie albo-variegatum; tubus anguste infundibuliformis, 8 mm. longus, extra viridi tinctus; limbus late apertus, fere plane regularis, 6-fidus, 4—5 cm. diametro, segmentis oblanceolatis obtusis vel acutiusculis 2.5 cm. longis, exterioribus 8—12 mm. latis, interioribus 2 lateralibus angustioribus et versus basin albo-ciliatis. *Stamina* 3 antica fertilia, filamentis 2 mm. longis, antheris valde curvatis introrsis basi in calcar acutum productis, 3 postica ad staminodia linearia apiculata 4 mm. longa flavida parallela reducta. *Ovarium* obtuse trigonum, ultra medium receptaculo immersum, 3-loculare; stylus 3 mm. longus; stigma minute 3-lobum; ovula 2-seriata, circiter 6 in quoque loculo. *Capsula* obovoidea, 12 mm. longa, supra medium cicatrice perigonii delapsi notata, 3-valvis, valvis dorso leviter sulcatis apiculatis. *Semina* oblongo-ellipsoidea, 2 mm. longa, testa sublaevi atro-brunnea. *Miers in Trans. Linn. Soc.* XXIV, 505 (1864; sub nom. mut. *T. cyano-crocea*†); *Haage & Schmidt, Gartenkat.* 1872 cum tab.; *Gard. Chron.* 1872, 219, fig. 91; *E. Regel in Gartenfl.* XXI, 97, t. 718 (1872); *Baker in Journ. Linn. Soc.* XVII, 496 (1879); *Leichtlin in Garden*, XX, t. 293 (1881); *Poisson in Rev. Hort.* LV, 226 (1883); *Caruel in Bull. Soc. Tosc. Orticult.* IX, 104, t. 6 (1884); *Mottet in Jardin*, II, 71 cum fig. (1888) et in *Rev. Hort.* LXXII, 70 cum tab. (1900); *G. Regel in Gartenfl.* LXXXVIII, 358 cum fig. 61 (1889); *Rev. Hort.* LXX, 472 (1898); *Godefroy-Lebœuf in Journ. Soc. Hort. Nat. France*, 3me sér. XXI, 371 (1899); *Magor in Gard. Chron.* LXV, 15, fig. 5 (1919). *T. c.* var. *Regelii*, *Baker*, l. c.; var. *Leichtlinii*, *Leichtlin* l. c., *Poisson*, l. c.; *G. Regel*, l. c.

T. cyanocrocus, as the name suggests, recalls superficially a crocus by its fibre-coated corm and general

* So named by Bertero after Tecofila, the daughter of his friend Professor Colla of Turin.

† This modification also occurs with other authors. It is unnecessary and misleading.

appearance. Of the three *leaves* which rise direct from the corm, the outermost is reduced to a thin membranous sheath which together with the sheaths of the other leaves embraces the slender scape to where it emerges from the ground, usually 5–7 cm. above the corm. The blades of the perfect leaves are linear to linear-lanceolate, measuring 7.5 to 12 cm. by up to 8 mm., usually widely channelled, often recurved and wavy along the margins; one or two additional leaves, much narrower than the others, spring from the scape about the level of the mouths of the sheaths, each supporting a flower borne on an erect or curved pedicel 3 to 5 cm. long. The widely open *perigone* is deeply 6-cleft with a slender tube 8 mm. long and with almost equal inversely lanceolate segments 2.5 cm. long and 8 to 12 mm. wide; it is beautifully sky- or gentian-blue with a more or less white throat from which white veins or streaks run into the segments, the amount of white varying very much; two of the inner segments are slightly narrower and ciliate towards the base. Of the *stamens* the anterior 3 are perfect with stalked almost crescent-shaped anthers spurred at the base and opening with terminal pores, whilst the posterior 3 are reduced to sessile linear straight staminodes, 4 mm. long. The *ovary* is inferior for two-thirds of its length and 3-celled and bears a slender simple style. The inversely ovoid *capsule* breaks up into 3 valves and holds a small number of broadly oblong dark-brown seeds.

DISTRIBUTION. Chile, in the Cordillera of Santiago, 3,000 m.

This very beautiful and interesting plant was discovered in 1862 by the Bavarian naturalist Friedrich Leybold in a spot known as Penquenes en la Dehesa at the headwaters of the Mapocho in the Cordillera of Santiago. A few years later the English zoologist Edwyn C. Reed collected it in the same region at Las Condes, about 10 kil. to the north-east of Santiago. These are the only records concerning its natural range which I have been able to trace. The plant appears therefore extremely limited in its distribution, much more so than its more modest and only congener, *T. violiflora*,

which inhabits the coast hills from Valparaiso northward to Coquimbo.

T. cyanocrocus was introduced into cultivation by Haage and Schmidt of Erfurt in 1872, but although advertised much and justly admired it has always been a somewhat rare plant on account of the difficulty of growing it. Leybold tells us that it grows in damp porphyritic soil at an altitude of almost 3,000 m. and flowers in October and November. He thought it would prove hardy in Germany, but general experience has not borne out his expectations. Even in western Europe and especially in this country it is considered as tender, and treated as a greenhouse plant. Yet M. Godefroy-Lebœuf says that it stood the severe winter of 1879-80 very well in the neighbourhood of Paris and flowered freely in March after having been buried under snow for weeks, and Mr. Magor reports having seen it in flower in a kitchen garden at Enys in Cornwall. In its home the climate of the Cordillera with a dry summer and autumn and a snowy winter imposes on our plant a long resting period which, as the snow melts, is followed by the rapid resumption of vegetative activity. Thus the solution of the gardener's problem may be rather in the postponement of sprouting, possibly enforced by cold storage during the most critical time, than in the careful protection from cold. This would not render the plant exactly "hardy," but it might ensure a reliable crop of flowers in the greenhouse or, if late planting-out is resorted to, also in the open. M. Godefroy-Lebœuf also describes the formation of cormlets, often in great number, from the old corms. I have seen no evidence of it in herbarium specimens nor have I found any confirmation of the statement in literature, but Sir John Ross of Bladensburg informs me that he increased his small stock of plants considerably in that way.

The systematic position of *Tecophilaea* has been much debated. Colla, its author, considered it as allied to the *Iridaceae*, adding that it might be the type of a new family. Poeppig and Endlicher, who described it independently as *Phyganthus*, placed it in *Haemadoreae*, then held to be a tribe of *Liliaceae*, but soon afterwards Endlicher moved it to the end of *Iridaceae* as a doubtful

member of that family. Leybold, taking up Colla's suggestion, created for it a new family, *Tecophilaceae*. Miers who had studied the genus in the field referred it to *Conanthereae*, a tribe proposed by D. Don for a small number of Chilean genera and considered to belong to *Liliaceae*. Since then its position in the tribe has not been challenged, but the affinity of the tribe itself has remained doubtful. Baker ranged it among his "aberrant" tribes of *Liliaceae*, whilst Bentham and Hooker transferred it to *Haemadoraceae*. More recently Pax, the last to deal with the group comprehensively, has classed it with the *Amaryllidaceae*, including in it, apart from *Tecophilaea*, *Walleria* (Madagascar), *Conanthera* (Chile), *Cyanella* (South Africa) and *Zephyra* (Chile). The problem of the mutual relations of those families and of their subdivisions is still unsolved and in any case far too complex to be touched upon in these pages; but as to the genera mentioned so much may be said that whilst *Tecophilaea* is clearly related with *Zephyra* and *Conanthera*, its connections with *Walleria* and *Cyanella* are apparently more technical than natural; if, however, they are admitted as constituting natural, that is phylogenetic, affinity they will add another to the many difficult evolutionary problems which the *Liliiflorae* offer to the systematist.

The two varieties which have been proposed, namely *elegans* with slightly narrower perigone-segments, and *Leichtlinii* with more white in the flower, particularly in the throat, do not represent more than slight variations within the range of ordinary fluctuations.

The specimen portrayed here was kindly communicated by Sir John Ross of Bladensburg, Rostrevor, Ireland, with whom it flowered in the greenhouse last January.

O.S.

Fig. 1, a whole non-flowering plant, nat. size; 2, a corm, cut in half, nat. size; 3 and 4, flowering specimens without corm, nat. size; 5, perigone-tube cut open $\times 3$; 6 and 7, fertile stamen in front and side view respectively, $\times 7$; 8, ovary after removal of the perigone, $\times 5$; 9, section through ovary, $\times 9$; 10, capsule, nat. size (from a herbarium specimen coll. by Reed); 11 and 12, seed from without and cut longitudinally, $\times 10$ (from the same source as fig. 10).

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RHODODENDRON LACTEUM.

China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, *Linn.*; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron lacteum, *Franch. in Bull. Soc. Bot. France*, XXXIII. 231 (1886), *nec Stapf, nec Hemsley in Bot. Mag.* t. 8372, ubi alia species postea *R. fctolacteum*, *Balf. f.* dicta errore sub hoc nomine depicta erat, a qua planta nostra foliis pro rata latioribus, dorso indumento simplici tenuiore, floribus minoribus sulfureis differt.

Arbor in patria ad 10 m. alta; rami crassi, novelli indumento parco albedo tenuissime araneoso-pulverulento induti, mox glaberrimi, cortice laevi purpureo-brunneo. *Gemmae* oblongae, obtusae, 2.5—3 cm. longae; perulae exteriores perlatae, rotundatae, brunneo-virides, dorso magis minusve puberulae et glandulosae, glandulis discoideis radiato-cellularibus succineis epidermati immersis viscosae, ad margines ciliatae. *Folia* circiter 7 ad incrementorum annuorum summitates congesta; lamina elliptico-oblonga, breviter acutata, basi late subcordato-rotundata, 8—15 cm. longa, 4—7 cm. lata, crasse coriacea, facie atro-viridis et glaberrima, dorso indumento tenui densissimo pallide cinnamomeo subvelutino induta, indumento pilis fasciculatis breviter stipitatis vel estipitatis constituto, pilorum radiis cylindrico-oblongis obtusis parietibus tenuissimis, costa nervisque supra impressis subtus prominulis, illa basi dilatata, nervis utrinque circiter 12; petiolus crassus, 1.5 cm. longus, facie tenuiter sulcatus. *Inflorescentia* valde contracta, multiflora, inter folia sessilis, rhachi brevi; bracteae late oblongae, subobtusae, utrinque sericeo-tomentosae, aurantiaco-alutaceae; pedicelli 1.2—1.5 cm. longi, magis minusve floccoso-tomentelli. *Calyx* ad marginem undulatum redactus. *Corolla* sulfurea, late campanulata, 5-loba, 3 cm. longa, ore 3.5—4 cm. diametro, glabra; tubus postice in fundo leviter rubromaculatus; lobi latissimi, rotundati, 1—1.2 cm. longi, margine subundulati. *Stamina* 10; filamenta 16—22 mm. longa, basin versus dilatata et papillosa; antherae brunneae, 3 mm. longae. *Discus* annularis, crassus, lobulatus, viridis. *Ovarium* oblongum, 6 mm. longum, dense albo-vel subcinnamomeo-tomentosum, pilis fasciculatis radiis tenuissimis liberis vel inferne varie connatis; stylus 2—2.2 cm. longus, glaber, viridulus; stigma discoideum, applanatum. *Balf. f. in Gard. Chron.* LIX. 168 (1916) et in *Trans. et Proc. Bot. Soc. Edinb.* XXVII. 97 (1916).

A tree up to 10 m. high in its home, with stout branches which are glabrous, except when quite young, and covered with a smooth purplish-brown bark. The *leaf-buds* are ovoid and viscous with fringed glandular scales, each bud giving rise to about 7 *leaves* whose elliptic-oblong blades are shortly pointed and broadly rounded or slightly cordate at the base and measure 8 to 15 cm. by 4 to 7 cm.; they are very coriaceous and dark green and glabrous above whilst the back is densely covered with a fine pale cinnamon-coloured, almost velvety felt,

and they are borne on very stout stalks 1·5 to 2 cm. long. The *flowers* are arranged in dense sessile bunches of about 20; they are supported by oblong silky bracts and borne on slightly woolly stalks, up to 1·5 cm. long. The *calyx* is represented by a wavy rim. The *corolla* is bell-shaped, about 3 cm. long and 3·5 to 4 cm. wide at the mouth, with 5 very short and broad lobes; it is uniformly sulphur-yellow with a weak red blotch inside at the base of the back. The 10 *stamens* have rather unequal filaments, much shorter than the corolla, and papillose low down. The *ovary* is whitish tomentose, the style green and glabrous.

DISTRIBUTION. Yunnan, mountains above Talifu and northwards to the watershed of the Yangtse.

Sir Isaac Bayley Balfour has very fully explained the circumstances under which this species was confused with a totally different rhododendron (*R. lacteum* var. *macrophyllum*, Franch. = *R. fictolacteum*, Balf. f.) and how it came by its name owing to a mistaken statement by its discoverer, the Abbé Delavay, who referred to the flowers as "blanc de lait" in his original label which Franchet had before him when describing the species (1886). Subsequently (1887) he gave the colour correctly as "jaune soufre" and to judge from Forrest's note on the same plant this is evidently the normal colour. It is with great reluctance that we retain a name which is so clearly wrong and misleading. *R. lacteum* is confined to the mountains above Talifu and their north-eastern continuation to the Kua la po, about 75 miles from Talifu. Here it abounds locally at altitudes from 3,000 to 4,000 m. On the Kua la po it forms almost pure forests whilst in the Tali range it also occurs as underwood in pine forests. It is hardy in this country, but Mr. J. C. Williams, to whom we are indebted for the contribution of this fine species, observes that it is particularly resentful of hot sun.

Sir Isaac placed it next to *R. Beesianum*, one of Forrest's discoveries, but that species has deep rich rose-red flowers and also differs much in other respects. O.S.

Fig. 1, a flowering branch, nat. size; 2, a fascicled hair from the underside of a leaf, $\times 120$; 3, a bract, nat. size; 4, lower part of a long filament and its anther, $\times 4$; 5, pistil with disc and calyx, $\times 2$; 6 and 7, hairs from the ovary, $\times 50$ (fig. 7 from near the top).

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CYCLAMEN BALEARICUM.

Baleares.

 PRIMULACEAE. Tribe CYCLAMINEAE.

CYCLAMEN, Linn.; Benth. & Hook. f., Gen. Plant. II. 634; Pax in Engl. & Prantl, Nat. Pflanzenf. IV. 1. 115 et in Engl. Pflanzenr. IV. 237 (1905); Hildebrand, Die Gattung Cyclamen (1898).

Cyclamen balearicum, Willk. in Oest. Bot. Zeitschr. XXV. 111 (1875) et in Linnaea, XL. 75 (1876) et Ill. Fl. Hisp. I. 6, t. 5 (1881); a *C. repando*, Sibth. & Sm., proximo foliis obtuse et saepe obscure lobulatis, floribus vernalibus minoribus albidis tenuissime violaceo-striatis distinctum.

Tuber depresso-globosum, 2 cm. diametro, vix 1 cm. altum, tenuiter ferrugineo-velutinum pilis fasciculatis, e centro infero radicans. *Caulis* brevissimus e centro supero ortus. *Folia* circiter 4 cum quoque tubere, iam ante flores evoluta; lamina late obcordata, sinu aperto vel rarius auriculis imbricatis clauso, obtusa, obtuse et saepe obscure lobulata vel repanda hydatodis praeter terminalem obscuris, foliorum maiorum 3—4 (raro ad 6) cm. longa, 2·5—4 (raro ad 5·5) cm. lata, facie atro-viridis, praeter marginem varie argenteo-maculata, dorso purpurea, glabra; petiolus gracilis, flexuosus, pro magna parte subterraneus, 2—3 cm. supra solum ascendens. *Flores* suaveolentes, vernales, 2 vel 3 cum quoque tubere; pedicelli 7—9 cm. longi, brevissime pubescentes. *Sepala* lanceolata, acuta, integra, 4—4·5 mm. longa, dorso et ad margines minute puberula. *Corolla* albida; tubus semiglobosus, 4—5 mm. longus, intus ad ostium roseo-suffusus; segmenta oblanceolata, saepe torta, subacuta, tenuissime violaceo-striata, vix 2 cm. longa. *Antherae* filamento brevissimo lato insidentes, lanceolatae, 2·5 mm. longae, flavidae, dorso verruculosae et purpureo-glandulosae. *Stylus* corollae ostium attingens nec exsertus. *Fructus* globosus, 8 mm. diametro, sepalis dilatatis cinctus. *Semina* oblique oblonga, 4 mm. longa, fusca. Hildebrand in Engl. Bot. Jahrb. XXIII. 601 (1897) et Gattung Cyclamen, 32, t. ii. figs. 16-28 (1898). *C. vernum*, Cambess. Enum. Pl. Balear. 127 (1827), non Reichb. *C. repandum*, Texid., Nuev. Apunt. 23 (1872), non Sibth. & Sm.

Like *C. repandum*, *C. coum* and a few other species, *C. balearicum* possesses finely velvety *tubers* which produce the long-stalked leaves already in the winter and the flowers in the following spring. The *leaf-blades* are inversely heart-shaped with slightly and bluntly lobed or almost entire margins and an open or closed (by the overlapping of the basal auricles) sinus, the larger of them measure usually 3 to 4 cm. by 2·5 to 4 cm. and are dark green with varying silvery patches on the upper side and bright purple on the lower side. The sweet-scented *flowers* are well raised above the leaves and have whitish corollas with inversely lanceolate, often twisted segments, delicately veined with violet,

and up to 2 cm. long. The *style* just reaches the mouth of the corolla.

DISTRIBUTION.—Balearic Islands only.

Although common in the Balearic Islands, and particularly in Mallorca, where it is found throughout the island from the lower levels to the summits of the Sierra (1,543 m.), favouring rich soil among stones and rocks, it is rarely found in cultivation, probably because its flowers are relatively small and of modest, though dainty, colouring. It is, however, interesting as one of the many species which are confined to those islands. It has been confused by earlier writers with *C. repandum*, but it is readily distinguished from it by its bluntly-lobed or almost entire leaves and its much smaller whitish flowers. The specimens from which the present plate was prepared were grown in the Royal Botanic Gardens at Kew from tubers received from Mr. P. W. Munn of Stourmouth, Bournemouth. They throw up the first leaves in December, flower from February to March and begin to withdraw in May, seeding well. They are kept in a cold frame and treated like other tender cyclamens.

Probably *C. balearicum* inhabits the smallest area among the species of the genus, other instances of greatly restricted distribution being afforded by *C. cyprianum* in Cyprus and *C. cilicicum* in the Taurus mountains of Cilicia. Hildebrand places the latter near our species, but it has orbicular leaf-blades and its very numerous rose-coloured flowers begin to appear in the autumn before the first leaves.

O.S.

Fig. 1, two whole plants, nat. size; 2, a flower, $\times 2.5$; 3, a flower with the corolla removed, $\times 3$; 4, pistil, $\times 6$; 5, the same surrounded by the anthers and the base of the calyx, $\times 6$; 6, an anther seen from within, $\times 8$; 7, a mature fruit, nat. size; 8, a seed, $\times 3$.

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TAB. 8990.

PRIMULA SUFFRUTESCENS.

North America.

PRIMULACEAE. Tribe PRIMULEAE.

PRIMULA, *Linn.*: *Benth. & Hook. f., Gen. Plant.* II. 631; *Pax in Engl. & Prantl, Nat. Pflanzf.* IV. 1. 104, and in *Engl. Pflanzenr.* IV. 237. 17.

Primula suffrutescens, A. Gray in *Proc. Amer. Acad.* VII. 371 (1868); inter species gregis *P. cuneifoliae*, Led., rhizomate sublignescente ramoso et foliis firmis insignis.

Herba perennis, glaberrima, rhizomate lignescente ad 15 cm. longo ramoso foliorum vestigiis oblecto, ramis ascendentibus. *Folia* creberrima, in ramis plerumque 1—3 cm. longis dense congesta et ad eorum apices rosulas formantia, cuneato-spatulata, longe in petiolum anguste alatum attenuata, eo incluso 1·5—3 cm. longa, 3—10 mm. lata, apice rotundata, superne dentata dentibus 5—9, firma, facie saturate viridia, dorso subflavescentia. *Scapus* 3—10 cm. altus. *Inflorescentia* umbellata, floribus paucis vel ad 10; bracteae lineares, acuminatae, ad 4 mm. longae; pedicelli 6—10 mm. longi. *Calyx* campanulatus, 5—7 mm. longus, pulverulento-glandulosus, ad vel ultra medium fissus, lobis lanceolatis acutis. *Corollae* tubus flavescentis, superne sensim paulo ampliatus; limbus pulchre purpureo-roseus, versus ostium aureum parce farinosus, 1·5—2 cm. diametro, segmentis obcordatis. *Antherae* 2 mm. longae, apiculatae, in forma brevistyla 5 mm. supra basin insertae. *Capsula* globosa, 4 mm. diametro, valvis ovatis apice vix recurvis. A. Gray in *Geol. Surv. Calif. Bot.* 1. 468 (1876) et *Syn. Fl. North Amer.* II. 1. 59 (1886); Pax in *Engl. Pflanzenr.* IV. 237. 113, fig. 32 (1905); I. B. Balf. in *Journ. R. Hort. Soc. XXXIX.* 182, fig. 86 (1913); Bailey, *Stand. Cycl. Hort.* V. 2809 (1916).

This species is distinguished by its well-developed somewhat woody *rhizome*, which produces short stout branches bearing dense rosettes of firm glabrous roundish blunt wedge-shaped *leaves*. The latter are including the broad leaf-stalk, which passes very gradually into the blade, 1·5 to 3 cm. long and, where widest, 3 to 10 mm. wide; the blade is conspicuously toothed in the upper part, dark green on the face and paler or almost yellowish on the back. The 2- to 10-flowered *umbels* are borne on scapes 3 to 10 cm. high and they have linear bracts supporting pedicels which vary from 6 to 10 mm. in length. The bell-shaped sparingly mealy *calyx* is 5 to 7 mm. long and cleft to or beyond the middle into 5 acute lanceolate segments. The deep rose or rose-purple *corollas* have a yellow eye; their tube is about 8 mm. long whilst the limb measures 1·5 to 2 cm. across. The globose *capsule*, 4 mm. in diameter, remains enclosed in the calyx.

DISTRIBUTION.—California, Sierra Nevada, from 36° to 39° N. Lat. and at altitudes from 3,000 to 3,900 m.

P. suffrutescens is one of the choicest of the American primulas, distinguished alike by the beautiful colour of its flowers, the peculiar foliage and the branching of its rhizomes, from which it has received its specific name, although the latter is perhaps not quite appropriate; for the branches of the rhizome are generally buried in the crevices of rocks or among stones, the leaf-rosettes only showing above the ground. Thus no aerial system of branches is formed as one might expect to find in an undershrub. According to Asa Gray, *P. suffrutescens* was discovered by Thomas Bridge on the mountains above the Yosemite Valley. This could not have been earlier than 1857—Bridges arrived in California late in 1856—but there are specimens of *P. suffrutescens* at Kew, collected by William Lobb, Veitch's collector, and dated (received ?) "1857." These specimens and others collected by Professor H. W. Brewer form the basis of A. Gray's description. The plant has since been recorded from various parts of the Sierra, but always from high altitudes. It has its nearest ally in *P. cuneifolia*, a subarctic species of the coasts and islands of the Behring Sea and the mountains of eastern Siberia and North Japan.

Our primula was according to Nicholson introduced into cultivation in 1884, but it seems to have remained rare in gardens although it should not be difficult to grow. At Edinburgh, so Balfour remarks, the plant thrives well in a light well-drained soil. It is true the branches are disposed to die off at the tip, but healthy shoots rapidly replace them. A reproduction of a splendid photograph of a group of *P. suffrutescens* in the Edinburgh Botanic Garden will be found in the Journal of the R. Horticultural Society for 1913 (fig. 86). The drawing which is reproduced here was originally prepared from one of those plants for the late Sir I. Bayley Balfour, but it was placed at our disposal by the courtesy of his successor, Professor W. Wright Smith. O.S.

Fig. 1, a plant, nat. size; 2, a flower seen from above, $\times 2$; 3, the same in longitudinal section; 4, an anther, $\times 5$.

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SCHIZOPHRAGMA INTEGRIFOLIA.

China.

SAXIFRAGACEAE. Tribe HYDRANGEAE.

SCHIZOPHRAGMA, Sieb. & Zucc.; Benth. & Hook. f., Gen. Plant. I. 641; Engl. in Engl. & Prantl, Nat. Pflanzenf. III. 2a. 76.

Schizophragma integrifolia, Oliv. in Hook., Ic. Plant. t. 1934 (1890); proxima *S. hydrangioidi*, Sieb. & Zucc., sed foliis maioribus firmiter plerumque integris vel minute dentatis, floribus maioribus, sepalis sterilibus plerumque multo maioribus magis oblongis differt.

Frutex ope radicum more *Hederæ* scandens, 2—3 m. altus, admodum ramosus, novellis tomentosis fere semper citissime calvescentibus; rami iuniores rubescentes vel castanei, tunc pallescentes, cortice lamellis tenuibus soluto. *Gemmae* axillares, ovoidae, ad 1 cm. longae, perulis exterioribus ovatis subobtusis, interioribus lanceolatis acuminatis demum valde elongatis, omnibus griseo- vel rufo-tomentosis. *Folia* decidua, opposita, longe petiolata; lamina ovata vel rotundato-ovata, basi rotundata, rarius subcordata vel breviter late cuneata, acute acuminata, integra vel partim glanduloso-denticulata, 4·5—15 cm. longa, 4—12 cm. lata, firme chartacea, facie viridis, dorso pallida, matura ad nervos pubescens vel interdum fere glabra vel raro subtomentosa, nervis utrinque 5—6 perobliquis uti venarum rete tandem prominentibus; petiolus ad 10 cm. longus, glaber vel laxe pilosus. *Paniculae* terminales, pendulae, laxae, 10—15 cm. longae, 15—20 cm. latae, sematophorae,* omnibus partibus pilosulae vel rarius glabrae, ramis oppositis vel suboppositis compressis 7—10 cm. longis e medio furcatis; cymae umbelliformes, multiflorae, circiter 1·5 cm. diametro, plerumque plures e furca ortae et tenuiter pedunculatae, caeterae (2 vel 3) secundum eius radios dispositae et sessiles; bracteae bracteolaeque cymarum filiformes, 1·5—1 mm. longae; pedicelli 2—3 mm. longi. *Sematophylla** quasi ramorum radios terminantia, e flore sterili cymae summae longe pedicellato commutata, pedicello 2—2·5 cm. longo saepe bracteolis 1 vel 2 ampliatis oblongis lanceolatisve foliaceis munito, flore ipso ad sepalum foliaceum ovatum vel oblongum acutum plerumque 4—8 cm. longum 2—3 cm. latum (rarius hebetatum et multo minus) tenuiter membranaceum flavido-lacteum redacto, rarius sepalorum aliorum vestigiis aucto. *Alabastra* 2·5—3 mm. diametro. *Receptaculum* turbinatum, vix 2 mm. longum, tenuiter 10-costatum. *Sepala* ovata, 1 mm. longa. *Petala* valvata, flavido-alba, elliptica, acuta, concava et intra parces pilosula, ad 3 mm. longa, caduca. *Stamina* 10; antherae subglobosae, 1 mm. longae; filamenta 3 mm. longa. *Stylus* crassus, 1 mm. longus, basi disco undulato-marginato circumdatus; stigma capitatum. *Capsula* elongato-turbinata, disco styloque induratis coronata, fusca, 5—6 mm. longa, 10-costata. *Semina* ambitu lanceolato-fusiformia, 2·5—3 mm. longa, 0·75 mm. lata, badia; nucellus basin versus situs 1 mm. longus; testa tenuis, anguste longitudinaliter areolata, areolis concavis; funiculus 0·5—1 mm. longus. J. H. Veitch in Journ. R. Hort. Soc. XXVIII. 62, fig. 21 (1903); C. Schneider, Handb. Laubholz. I. 394 (1906); Rehder in Sargent, Plant. Wilson. I. 41 (1911); Mottet in Rev. Hort. 1919, 275, fig. 87, 88. *S. hydrangioides* var. *integrifolium*, Franch. in Nouv. Arch. Mus. Paris, sér. 2^{me}, VIII. 226 (1885); Pl. David. II. 44 (1888).

* *Sematophorae*, i.e. bearing special show- or semaphore-leaves (*sematophylla*), in this case highly modified sepals (see below).

A *shrub* climbing on or leaning against rocks, usually almost glabrous except for the youngest parts which are greyish- or brownish-tomentose with reddish or at length pale-brown branches and with a rich bright green rarely slightly glaucous, deciduous foliage. The opposite *leaves* are borne on long (up to 10 cm.) stalks; their blades are ovate to roundish-ovate from a mostly broad rounded base and are drawn out into a generally short point with the margins entire or minutely toothed for some distance, their dimensions varying considerably (from 4.5 to 15 cm. by 4 to 12 cm.). The nodding terminal *panicles* measure 10 to 15 cm. by 15 to 20 cm. and bear numerous many-flowered cymes on the rays of their forked branches, each ray ending with a usually large (4 to 8 cm. by 2 to 3 cm.) creamy-white ovate or oblong leaf, the modified sepal of a barren flower whose parts are otherwise suppressed and which is raised on an enlarged stalk well above the cyme to which it belongs. The normal *flowers* measure 2.5 to 3 mm. in diameter when in bud and consist of a short top-shaped receptacle, small ovate *sepals* and creamy-white elliptic concave *petals*, about 3 mm. long and exceeded by the slender *filaments* with their almost globose pale anthers which surround the short stout *style* and its knob-shaped stigma. The *capsules* are of the shape of an elongated top and are covered by the hardened disk which is crowned by the persistent style; they open by the falling away or the gradual decay of the thin wall situated between the frame-work of the 10 strong longitudinal ribs. The *seeds* are lanceolate, 2.5 to 3 mm. long and have a loose thin long-meshed seed-coat with the short kernel at its base.

DISTRIBUTION. Central and western China, widely distributed from West-Hupeh to West-Szechuan between 900 and 2,300 m., also in Kiangsi at 900 m.

The function of the enlarged sepals of the sterile flowers which in certain hydrangeas compensate by their showiness for the inconspicuousness of the fertile flowers is in *Schizophragma* taken over by a single sepal of one of the flowers of the uppermost cyme of each, or at least some, of the branches of the inflorescence. For this purpose the sepal is not only very much enlarged

and conspicuously coloured, resembling in shape and nervation a foliage-leaf, but it is at the same time carried outside the periphery of the panicle by the enlargement of its pedicel which appears to continue the branch, with the remainder of the cyme laterally attached to it. Thus these sepals act like signalling flags or semaphores, advertising the otherwise very modest inflorescences at great distances. Very similar semaphore-sepals occur in not a few genera of *Rubiaceae*, as *Mussaenda*, *Mussaendopsis*, *Capirona*, *Calycophyllum*, etc., but here the fertility of the flowers carrying them is in no way affected. In *Schizophragma* all the other parts of the flower are completely suppressed except for a few tiny scales, the rudiments of sepals. The semaphore-sepals are occasionally much reduced but apparently not in correlation with other characters. Whether this reduction runs in strains or marks merely an extreme of fluctuation is uncertain, but it seems worth testing as it affects the horticultural value of the plant. Rehder has distinguished a number of varieties, based on leaf-characters (stoutness, shape, hairiness, denticulation) and the shape and size of the semaphore-sepals; but to judge by the ample herbarium material at my disposal, they come within the range of ordinary fluctuation and are unconnected with distribution. The genus *Schizophragma* comprises three other species, one (*S. hydrangioides*, the type of the genus), widely distributed through the forests of Japan, and another (*S. hypoglaucum*) only known from Mt. Omei in Szechuan, and a third from Formosa (*S. Faurei*). *S. integrifolia* was discovered by Père David in the neighbourhood of Mupin in 1869, and it was originally described as a variety of *S. hydrangioides* (Botanical Magazine, t. 8520), from which it is, however, sufficiently distinguished by the characters given above in the differential diagnosis. Henry collected it subsequently in Hupeh whilst Wilson established its occurrence in numerous localities in that province and in Szechuan. He also found it south-east of Hupeh at Kuling in the Province of Kiangsi, 25 kil. south of Kiu-Kiang. Here, as elsewhere, it grows on cliffs, attaching itself to the rock by adventitious roots after the fashion of ivy.

Schizophragma much resembles certain species of *Hydrangea* in appearance—in fact, *S. hydrangioides* has often been mistaken in gardens for *Hydrangea petiolaris*—but the laterally dehiscent capsules and the solitary stout style distinguish the genus very clearly, quite apart from the singular semaphore-leaves.

S. integrifolia was first introduced into cultivation by E. Wilson in 1901 from seed collected by him in Hupeh the previous year. It has proved perfectly hardy in this country and owing to its fine foliage and striking inflorescences as well as its vigorous growth it ought to form a handsome cover for walls and the trunks of trees. It can easily be propagated from cuttings. The specimen from which the present plate was prepared was communicated by Professor W. Wright Smith of the Edinburgh Botanic Garden, where the plant flowers freely. It is of Mr. Wilson's introduction and was received from Sir John Stirling Maxwell in 1908. O.S.

Fig. 1, a flowering branch, nat. size ; 2, portion of a stem with adventitious roots, nat. size ; 3, the base of a semaphore-sepal with rudiments of the other sepals, $\times 3$; 4, a flower, $\times 5$; 5, a petal seen from within, $\times 6$; 6, a receptacle with style and stigma, $\times 6$; 7, a mature capsule, $\times 2$; 8, a seed, $\times 7$.

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TAB. 8992.

HARDENBERGIA COMPTONIANA.

Australia.

LEGUMINOSAE. Tribe PHASEOLEAE.

HARDENBERGIA, *Benth*; *Benth. & Hook. f., Gen. Plant.* 1. 530. *Kennedya*, *Taubert in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 361.

Hardenbergia Comptoniana, *Benth. in Endl., Enum. Pl. Hueg.* 41 (1837); proxima *H. monophyllae*, *Benth.*, sed foliolis 3-nis vel 5-nis et leguminibus haud pulpa faretis distincta.

Suffrutex volubilis, glaber, caulibus teretibus tenuiter costatis interdum inter costas striatis. *Folia* stipulata stipellataque, 3-foliolata vel 5-foliolata et tunc foliolis lateralibus geminatis; foliola brevissime petiolulata, mobilia, linearia vel lineari-lanceolata vel inter ovatum et lanceolatum variantia, obtusa, mucronato-apiculata, rarius subacuta, basi rotundata vel subtruncata, magnitudine admodum variabilia, 4—11 cm. longa, 0·4—5·5 cm. lata, chartacea, laete viridia, rarius subglauca, facie eximie reticulata, nervis in foliolis linearibus fere angulo recto patentibus, in latoribus magis minusve obliquis; foliolum terminale simillimum, nisi longius, rhachis internodio plerumque 0·8—1·5 cm. (raro ad 2·5 cm.) longo a lateralibus distans; stipulae ovatae vel lanceolatae, saepe obliquae, acute acuminatae, ad 4 mm. longae; petioluli 1—5 cm. longus; stipellae rubescentes, lineares vel lineari-lanceolatae, 2—3 mm. longae. *Racemi* axillares et terminales, interdum ramo secundario e basi aucti, rarius fere paniculati, 6—12 cm. longi, floribus 2-natis; pedunculus 1—3 cm. longus; bracteae lanceolatae, longe acuminatae, circiter 3 mm. longae, caducae; pedicelli graciles, parce puberuli, 4—7 mm. longi; bracteolae nullae. *Calyx* campanulatus, 3·5 mm. longus, ad $\frac{1}{2}$ 2-labiatus, labio supero 2-dentato, infero alte in dentes 3 triangulares breviter subulato-acuminatos diviso, dentibus omnibus minute ciliolatis. *Corolla* pulchre violaceo-caerulea; vexillum suborbiculare, emarginatum, breviter unguiculatum, circiter 11 mm. latum, paulo minus altum, medio ex ungue area alba maculis viridibus notata picta; alae circiter 10 mm. longae, lamina oblique obovata (explanata fere semi-orbiculari et subito in unguem albidum contracta), lineari-auriculata; carinae petala alis similia, sed 7 mm. vix longiora. *Stamen* summum liberum, filamentum 4 mm. longo, caetera fere ad 3 mm. coalita; antherae viridi-flavescentes. *Ovarium* lineare, sensim in stylum brevem abiens, cum eo 4 mm. longum; stigma capitatum. *Legumen* oblongum, stylo indurato mucronulatum, nigricans, turgidum, 3—4 cm. longum, 0·8—1 cm. latum, valvis firme coriaceis intus albis laevibus. *Semina* oblonga, ad 4 mm. longa, 2 mm. lata, fusca, funiculo brevi latiusculo, strophiole oblongo crasso 2 mm. longo albido. Meisn. in Lehm., *Pl. Preiss.* I. 94 (1844); *Benth. Fl. Austral.* II. 247 (1864); Diels & Pritzel in *Engl. Bot. Jahrb.* XXXV. 271 (1904); *H. Huegelii*, *Benth. in Endl., Pl. Hueg.* 41 (1837); *H. digitata*, *Lindl., Bot. Reg.* 1840, t. 60. *H. Lindleyi*, Meisn., l.c., *H. Makoyana*, *Ch. Lem.* III. *Hort. V.* t. 179 (1858); E. Andrée in *Rev. Hort.* 1882, 344. *H. macrophylla*, *Journ. Hort. ser.* 3, XXX. 361 (1895). *Glycine Comptoniana*, *Andr., Bot. Rep.* t. 602 (1810); *Bot. Reg.* t. 298 (1818). *Kennedya Comptoniana*, *Link, Enum. Pl. Hort. Berol.* II. 235 (1822); *DC., Prodr.* II. 383 (1825); *Van Geel, Sert. Bot., V. Class XVII.* (1830). *K. macrophylla*, *Lindl., Bot. Reg.* XXII. t. 1862 (1836).

A twining or trailing *shrub* with slender finely ribbed stems, quite glabrous except the slightly hairy axes of

the inflorescences. The stipulate and stipellate *leaves* are 3- or 5-foliolate with the lateral leaflets in pairs and 0·8 to 1·5 (rarely up to 2·5) cm. distant from the terminal, all carried on very short stalklets ; the size and shape of the leaflets is extremely variable, ranging from linear and lanceolate to ovate and from 4 to 11 cm. by 0·4 to 5·5 cm. ; they are papery, bright green and very neatly reticulate ; the common leaf-stalk is 1 to 5 cm. long and rises from between a pair of oblique ovate to lanceolate stipules, up to 4 mm. long. The axillary and terminal *racemes* are 6 to 12 cm. long and bear the flowers on paired slender stalks 4 to 7 mm. long and supported by lanceolate very early deciduous bracts. The *calyx* is bell-shaped, 3·5 mm. long, 2-lipped, and 5-toothed. The *corolla* is of a brilliant violet-blue or a deep almost pure blue, with a white central spot marked with green dots on the round shortly clawed and slightly notched standard which measures about 11 mm. across, whilst the blunt obliquely obovate wings are 10 mm. long exceeding the whitish keel-petals by 3 mm. The uppermost *stamen* is quite free from the others which are united into a sheath for about 3 mm. The linear *ovary* passes gradually into the very short style. The mature *Pods* are oblong and almost round and dark brown, measuring 3 to 4 cm. by 0·8 to 1 cm. ; the leathery curling valves are snow-white and smooth inside and hold about 8 brown stout oblong *seeds* with a whitish strophiole ; the seeds being 4 mm. by 2 mm.

DISTRIBUTION. West-Australia, along the coast from the Swan river to King George's Sound.

Although in cultivation for more than a hundred years this very pretty plant has so far not been depicted in this Magazine, where the genus is represented only by two plates (tt. 263 and 2619), both illustrating its less ornamental congener *H. monophylla*, under the obsolete names *Glycine bimaculata* and *Kennedya ovata*. *H. Comptoniana* inhabits the littoral of West-Australia from Perth and Freemantle to the Stirling Division on King George's Sound, mostly twining in shrubs or trailing on gravelly or sandy ground, and in the southern section of the area, according to Diels, it is particularly partial to

humid Eucalyptus-woods. It became first known through specimens grown in Lady Northampton's garden at Castle Ashby, Northampton, in 1810.* Andrews figured Lady Northampton's plant in his "Repository" under the name *Glycine Comptoniana*, Compton being the family name of the Marquises of Northampton. It was soon established in various gardens and in 1822 it was removed to *Kennedya* by H. F. Link of Berlin who recognized its affinity with *K. monophylla*, an early introduction of Sir Joseph Banks's from New South Wales. A few years later A. P. De Candolle, although admitting its close connection with *K. monophylla*, queried its position in *Kennedya*. Taking up his suggestion Bentham in 1837 established the genus *Hardenbergia* on those and several other species which he then thought might be distinguished, characterizing it by its general habit, and the shape of the calyx and corolla. The name *Hardenbergia* was chosen in commemoration of the Austrian Countess Francisca Hardenberg, a sister of Baron Huegel, whose Australian collections Bentham was then working out in collaboration with Endlicher and other botanists. Bentham also retained *Hardenbergia* as a distinct genus in the "Genera Plantarum" (1865); but Baillon in his "Histoire des Plantes" (1870) and Taubert in "Natürliche Pflanzenfamilien" (1891) saw in *Hardenbergia* only a group of kennedyas which they did not even class as a distinct subgenus or section. To me *Hardenbergia* seems to form a perfectly natural genus, recognizable by its general facies and the shape, size and colour of its flowers. The typical large-flowered kennedyas (see Bot. Mag. tt. 268, 270, 3652) are very distinct, and it is rather the group of smaller-flowered umbellate species which suggests closer generic affinity. The areas of *Hardenbergia* and *Kennedya* overlap so that no conclusions as to their phylogenetic history can be drawn from their distribution. Three species of *Hardenbergia* are at present recognized,

* Van Geel says it was introduced in 1803, whilst Loudon dates its introduction from 1806. As R. Brown collected the plant at King George's Sound on April 29th, 1802—he described it (in MS.) and distributed it as "*Glycine*"—there is little doubt that he was not only its discoverer but also instrumental in introducing it into cultivation.

H. Comptoniana in the south-west, *H. monophylla* in the east and south-east of the Australian continent and *H. retusa* in Queensland. *H. Comptoniana* is remarkably variable in the number, shape and size of the leaflets. The ample synonymy quoted above arises entirely out of that fact. It was only as the plant became better known from specimens collected in the wild state and from repeated introductions that these variations were recognized as really unstable and therefore unreliable for purposes of discrimination.

H. Comptoniana is generally grown as a green-house plant in this country, trained on poles or rafters or in bush-form, twining round cylindrical or balloon-shaped trellises where the racemes, crowded into a smaller space, show the brilliantly coloured flowers to better effect. However, Mr. W. Andrews, head-gardener to Lord Falmouth at Tregothnan, Truro, Cornwall, to whom we are obliged for the material from which the present plate was prepared, writes that he has grown the plant for fifteen years in the open in a sheltered corner on the south-west side of the mansion, where it rambles over other climbers and an acacia. It flowers there quite freely for quite two months commencing about Christmas. It fruits and occasionally matures the seed from which young plants have been raised. Its worst enemy is cold winds which sometimes kill the tips of the young growth. The soil in which Mr. Andrews grows the plant so successfully is a mixture of peat, loam and sand which receives an annual dressing of peat and leaf-mould. In the absence of seeds propagation from green-wood cuttings may be resorted to. O.S.

Fig. 1, a flowering branch, nat. size; 2, a calyx, $\times 7$; 3, a standard, $\times 3$; 4 keel with a wing-petal, $\times 3$; 5, a wing-petal, flattened out, $\times 3$; 6, staminal tube, flattened out, $\times 6$; 7, free stamen, $\times 6$; 8, pistil, cut open, $\times 6$; 9, a pod, nat. size; 10, a seed, $\times 3$.

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TAB. 8993.

RHODODENDRON SEARSIAE.

China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, *Linn.*; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendrum Searsiae, *Rehder & Wilson in Sargent, Pl. Wilson.* I. 522 (1913); affine *R. polylepidi*, *Franch.*, a quo distat imprimis foliis dorso inter squamulas ope papillarum congestarum albarum caeruleo-glaucis neonon calyce magis evoluto, corolla extra parcius lepidota, capsula paulo maiore.

Frutex 2—2.5 m. altus, ramis gracilibus, novellis dense flavido-lepidotis; ramuli mox fusciscentes vel brunnescentes, lepidoto-verrucosi. *Gemmae* lanceolato-oblongae, acutae, ad 1 cm. longae, perulis oblongis ciliolatis. *Folia* breviter petiolata, 5—8 ad ramulorum apices congesta, magis minusve deflexa; lamina lanceolata, acute acuminata apice leviter depressa, basi cuneata vel breviter acuta, 4—8 cm. longa, 1.2—2.5 cm. lata, tenuiter coriacea, facie atro-viridis, primo parce nigro-lepidota, demum glabra et lucidula, dorso ope papillarum dense congestarum eximie caeruleo-glaucis et squamulis flavidis vel rubescentibus magnitudine variis conspersa, costa illic impressa hic prominula, nervis utrinque 8—10 tenuibus; petiolus 3—5 mm. longus, lepidoto-verrucosus. *Flores* 4—8, fere in umbellam congesti; inflorescentiae gemma ovoidea, acuta circiter 12 mm. longa, 9 mm. diametro, olivaceo-flavida, perulis caducis tenuiter papyraceis ciliolatis caeterum praeter squamulas glabris; pedunculus brevissimus, perularum bractearumque cicatricibus insigniter notatus; bractee oblongae, acutae, tenues, flavido-brunnescentes, squamulosae, ciliatae; bracteolae filiformes, 1.5 cm. longae; pedicelli 8—12 mm. longi, graciles, lepidoto-verrucosi. *Calyx* late cupularis, 5-lobus, 1—2 mm. longus, lepidotus, lobis rotundatis inaequalibus, uno alterove saepe elongato tenuiore et ciliato. *Corolla* e tubo infundibuliformi late aperte campanulata, pallide purpurea vel fere alba, extra sparsissime lepidota; tubus 10—12 mm. longus, intra ad fauces postice viridi-maculatus et sub eas parce pilosus; limbus paulo obliquus, 5 cm. diametro, 5-lobatus, lobis ovatis vel anticis ovato-oblongis rotundatis vel subacutis, posticis 1.5—2 cm., anticis ad 2.5 cm. longis, omnibus 1.3—1.5 cm. latis. *Stamina* 10; longiora ad 2.5 cm. longa, omnium filamenta paulo supra basin per spatium 3—4 mm. villosula. *Ovarium* 5-loculare, oblongum, praeter annulum basalem laevem dense squamulis flavido-viridibus obtectum, 4 mm. longum; stylus demum ad 3.5 cm. longus, purpurascens, glaber vel pilis perpaucis minimis conspersus. *Capsula* cylindrico-oblonga, 10—12 mm. longa, lepidota, nigricans, valvis oblongis 5 leviter recurvis. *Semina* magis minusve oblonga, exalata, 1.5—2 mm. longa. I. B. Balf. in *Not. R. Bot. Gard. Edinb.* XI. 93 (1919).

A shrub up to over 2 m. high, with slender branches which, when young, like all other growing parts, are densely covered with a yellowish scaly scurf, but later on are merely warty owing to the persistent larger scales. The leaf-buds are rather small, lanceolate oblong and acute with oblong ciliolate scales. The leaves are to

the number of 5 to 8 congested at the tips of the branches and when mature more or less deflexed; their short-stalked blades are lanceolate from a narrow base and taper to an acute point; they are 4 to 8 cm. long and 1½ to 2·5 cm. wide, dark-green, smooth and slightly glossy on the face and bluish-glaucous on the back with a yellow to red-brown scurf of scales of varying size scattered all over. The *buds* of the *inflorescences* are egg-shaped, acute and up to 12 mm. by 9 mm. with olive-yellowish dark-edged ciliate scales; they give rise to short sessile umbel-like racemes of 4 to 8 flowers which are borne on slender scurfy stalks 8 to 12 mm. long, supported by early deciduous membranous tawny ciliate bracts and bearing filiform bractlets at their base. The *calyx* is very short, cup-shaped with often unequal and ciliate scurfy rounded lobes. The pale rose-purple or almost white *corolla* is somewhat obliquely funnel-shaped with a wide throat, marked with light-green spots on the back, and with a widely open 5-lobed limb, about 5 cm. across; it is very sparingly, if at all, scurfy on the outside; the tube is 10 to 12 mm. long whilst the longer (lower) lobes measure up to 2·5 cm. by 1·3 to 1·5 cm. The longer of the 10 *stamens* are about 2·5 cm. long and are like the others villous above the base. The 5-celled *ovary* is densely covered with yellow-green scales and bears a slender, mostly glabrous style, 3·5 cm. long. The dark brown *capsule* is 10 to 12 mm. long and opens by 5 oblong valves.

DISTRIBUTION.—West-Szechuan; on Wa-shan, at 2,300 to 3,000 m.

R. Searsiae belongs, like *R. polylepis*, with which it has been compared above, to the "*triflorum* series," a somewhat large group—Balfour estimates it as comprising over 30 species—with its centre in Szechuan, whence it ranges into Yunnan and the eastern and central Himalaya. The group has been illustrated in this Magazine by a number of plates, as for instance t. 7621 (*R. rubiginosum*), t. 8300 (*R. Keysii*), t. 8309 (*R. Harrovianum*, considered to be identical with *R. polylepis*), t. 8605 (*R. Davidsonianum*), t. 8620 (*R. concinnum*), etc. It has nevertheless been considered desirable to add to these by the inclusion of the present

species, because of the difficulty of discriminating between certain members of the group without adequate illustration, and partly because *R. Searsiae* is one of the prettiest and hardiest of the series. It is not only a strong grower, but, as Professor W. Wright-Smith points out to us, also very accommodating as regards soil and position. At Edinburgh it thrives in much more exposed situations than many of the Chinese rhododendrons and it is most floriferous when it receives the full benefit of the sun. The drawing for the present plate was, like others which we have the privilege of using for the enrichment of this and further volumes, originally made for Professor Balfour and under his direction from plants raised from Wilson's seed number 1343 through the kindness of Sir John Stirling Maxwell in 1909. Our species is most readily distinguished from *R. polylepis* by the bluish-glaucous colour of the under-side of its leaves with which the scurf-scales studding it contrast very vividly. Similar colour-contrasts occur in other species of the group, but here as in *R. oreotrephes*, *R. triflorum*, *R. Keysii* and one or two more the intense glaucousness is due to the presence of innumerable wax-covered papillæ which form an almost continuous layer.

R. Searsiae was discovered in 1908 by Mr. E. Wilson growing in thickets on the sacred mountain Wa Shan in Central Szechuan between 2,300 and 3,000 m., and this is so far the only locality from which it has been recorded, whilst its near congener *R. polylepis* ranges over a wide area in western Szechuan and seems even to reach Yunnan in the upper Mekong valley. The name "*Searsiae*" was given by the authors in dedication to "Sarah Choate Sears, artist, lover and successful cultivator of plants."

O.S.

Fig. 1, a flowering branch, nat. size; 2, a portion of the upper side of a leaf, $\times 10$; 3a, portion of the lower side of a leaf, $\times 10$; 4, a bract, $\times 3$; 5, a bracteole, $\times 6$; 6, a corolla cut open and spread out, nat. size; 7 and 8, a short and a long stamen, $\times 4$; 9, pistil, $\times 4$; 10, a capsule, nat. size; 11, the bud of an inflorescence, nat. size.

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TAB. 8994.

LITHOSPERMUM OLEIFOLIUM.

Spain.

BORRAGINACEAE. Tribe LITHOSPERMEAE.

LITHOSPERMUM, *Linn.*; *Benth. & Hook., Gen. Plant.* II. 860; *Guerke in Engl. & Prantl, Nat. Pflanzenf.* IV. 3a. 122.

Lithospermum oleifolium, *Lapeyr., Hist. Abr. Pl. Pyr. Suppl.* 28 (1813); a *L. diffusum*, *Lag.*, proximo distat foliis latioribus oblongis planis dorso canescentibus, calycis corollaeque ratione (illo pro rata multo longiore), staminibus ad fauces glabras insertis, stigmate 2-lobo.

Fruticulus ramosissimus, late diffusus, 10—30 cm. altus, ramis gracilibus ascendentibus inferne nudis, hornotinis incano-hirsutis. *Folia* in ramis sterilibus abbreviatis magis minusve congesta, in ramis florentibus laxè sparsa; lamina oblonga vel elliptico-oblonga, obtusa, basi in petiolum brevem attenuata, plana, 12—15 mm. longa, 5—6 mm. lata vel in ramis sterilibus interdum valde ampliata (30—40 mm. longa, 12—15 mm. lata), facie viridia, appresse pilosa, dorso dense albo-sericea, costa tenui, nervis plane inconspicuis. *Flores* in cincinnis racemiformibus 5—7-floribus foliatis demum ad 3 cm. elongatis; folia floralia superiora multo angustiora, summa saepe admodum redacta; pedicelli brevissimi. *Calyx* 6—8 mm. longus, fere ad basin in segmenta anguste linearia subaequalia vel aequalia incano-sericea fissus. *Corolla* in alabastro rosea, aperta caerulea, extus sericeo-villosa, 15—18 mm. longa; tubus 9—12 mm. longus, intus glaber; limbus late campanulatus, ore eformicatus, 7—9 mm. diametro, lobis rotundato-ovatis. *Stamina* infra tubi os ipsum inserta, antheris subsessilibus 1.5 mm. longis. *Stylus* 11—13 mm. longus; stigma minute 2-lobum. *Nuculae* oblique ovoideae, obtuse subacuminatae, facie carinatae, dorso latae, 3 mm. longae, griseo-albae, laevissimae, nitidissimae, basi oblique truncatae, circa stipitem brevissimum profunde exaratae. DC Prodr. X. 81 (1846); Gren. & Godr., Fl. France II. 518 (1850); Willk. & Lange, Fl. Hisp. II. 500 (1870) et Suppl. 165 (1893); Vayreda in Anal. Soc. Esp. Hist. Nat. VIII. 460, t. x. (1879); Bubani, Fl. Pyr. I. 485 (1897); Coste, Fl. France II. 588, c. fig. (1903); Rouy & Fouc., Fl. France X. 344 (1908); *Lithodora oleifolia*, Griseb., Fl. Rum. II. 531 (1844).

L. oleifolium is a low prostrate shrub of the habit of *L. diffusum*, but with flat oblong or elliptic oblong leaf-blades which are 12 to 15 mm. long and 5 to 6 mm. broad, or occasionally on barren shoots, twice as long and broad, and densely whitish-silky on the back. The flowers are arranged in 5- to 7-flowered leafy scorpioid cymes which finally lengthen out to 3 cm. The calyx is 6 to 8 mm. long and cleft almost to the base into narrow linear hairy segments. The sky-blue corolla is 15 to 18 mm. long and silkily villous outside, but quite glabrous inside; its tube is much longer (by about 6 mm.) than the bell-shaped limb which is 7 to 9 mm. wide and deeply

divided into 5 round lobes. The *stamens* are inserted below the mouth of the tube, the anthers not exceeding it. The *style* is 11 to 13 mm. long and bears a minute 2-lobed stigma. The porcelain-like whitish *nutlets* are obliquely egg-shaped with a sharp keel on the face and a broad perfectly smooth back and measure 3 mm. by 2·2·5 mm.

DISTRIBUTION. Catalonia, very rare, in crevices of rocks in the Pyrenees.

The species figured in the accompanying plate resembles very much in general appearance the well-known *L. diffusum* (*L. prostratum* of many authors), but it is perfectly distinct in the leaves (see above), the relatively long calyx, the lighter blue of the corolla, which is quite glabrous in the throat, the higher insertion of the stamens and the 2-lobed stigma. It is extremely limited in its distribution, its area being confined to a few square kilometers on the Spanish side of the Eastern Pyrenees. Here it was discovered in 1814 by M. Xatard, a Justice of the Peace at Prats de Mollo (Dept. Pyr. Or.). He found it growing in the crevices of rocks above the chapel of San Aniol de Uiga on the banks of the stream Cauméla which through the Rio de Aniol and the river Llera drains ultimately into the Fluvia. Vayreda says it is also abundant on the shady cliffs of the "Toy de las Valls" between Manos and Talaxa, about 3 km. to the south-west of San Aniol. A further station is quoted by him as "rocks in the Campo de Bassagoda" to the south-east of San Aniol. The fact that San Aniol was on certain labels described as "près de Prats de Mollo"—it is actually situated 13 km. to the south-east of the town of this name—led to the assumption that the plant grew on French territory and to its inclusion in certain French floras.

It is very rare in gardens and we are greatly obliged to Miss Willmott for the communication of specimens which enabled us to include this beautiful plant in the pages of the Botanical Magazine. Miss Willmott cannot trace the origin of her plant which she has had for twenty-five years and which measures now 1 m. across with a height of from 12 to 15 cm. It flowers with her abundantly in

May and June. According to her experience it should be given a well-drained position in the rock-garden and be protected from excessive moisture. It appreciates old mortar-rubble and may be propagated from cuttings or divisions or raised from seed.

L. oleifolium belongs to a well-characterized group of low shrubby species confined to the Mediterranean countries. *L. fruticosum* and *L. diffusum*—the latter more familiar in gardens under the later name *L. prostratum*—are the best-known members of it. They are both widely distributed in the Iberian peninsula, *L. fruticosum* extending beyond it to the “olive region” of southern France as far as the Var and *L. diffusum* along the Atlantic coast to Cape Finisterre. *L. diffusum* has also been found at Tangiers and in the interior of Morocco. The other species inhabit very small, and in some cases much broken-up, areas, namely, *L. conso-brinum* in Algeria (Arzeu on the coast east of Oran); *L. rosmarinifolia* in Algiers (Bone and Bougie), Sicily (all over) and on the cliffs of the bays of Naples and Salerno; *L. Zahnii* on the rocky heights of Mount Selitsa, a western spur of the Laconian Taygetos; *L. hispidulum* in Crete, Karpathos, Rhodes and Cyprus and on the coast near Mersina in Cilicia. Although perfectly distinct as species, these plants are closely connected by their general facies and the structure of the corolla. Helene Spengler* on a comparative study of the corollas of *Lithospermum* has recently come to the same conclusion. It is evident that we have here to deal with a group which is in its last phase of evolution and doomed to disappearance. Grisebach long ago recognised its independent position and raised it to generic rank, under the name *Lithodora*. A revision of *Lithospermum* which is much desired will show whether *Lithodora* should not be restored as a genus. Wettstein has already suggested the exclusion from the genus of certain desert species (*L. callosum* and *L. Kotschyi*), and the South-African species will probably share their fate, the remainder of the genus representing an entirely boreal type.

O.S.

* In Oest. Bot. Zeitschr. LXVIII, 115 (1919).

Fig. 1, a flowering branch, nat. size ; 2, a flower-bud with unusually unequal calyx-segments, $\times 4$; 3, longitudinal section through a flower with the corolla removed, $\times 4$; 4, a corolla cut open, $\times 3$; 5, anthers, $\times 9$; 6, a nutlet, face view, $\times 5$; 7, a seed, $\times 7$.

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TAB. 8995.

THRYPTOMENE THYMIFOLIA.

Australia.

MYRTACEAE. Tribe CHAMAELAUCIEAE.

THRYPTOMENE,* Endl. ; *Benth. & Hook. f. Gen. Plant.* I. 700 ; *Niedenzu in Engl. & Prantl. Nat. Pflanzenf.* III. 7. 103.

Thryptomene thymifolia, *Stapf (spec. nov.)* ; *T. tenellae*, Benth. et *T. urceolari*, F. Muell., affinis, sed ab utraque foliis planis oblanceolato-oblongis statim distinguenda.

Fruticulus 1 m. altus, glaberrimus, ramis gracilibus, junioribus subquadrangularibus, cortice sub folia pallescente et demum soluto, ramulis gracillimis 5—8 cm. longis oppositis. *Folia* oblanceolato-oblonga, obtusa vel subacuta, plana, 6—8 mm. longa, 1·5—2 mm. lata, tenuiter coriacea, viridia, utrinque glandulis nigricantibus minutis munita ; petiolus vix ullus. *Flores* in axillis foliorum ramulorum pedicellati, singuli vel 2-ni ; pedicelli tenues, 1—1·5 mm. longi, cernui, cum basi receptaculi articulati et ibi cupula minuta (vestigii bractearum maxime caducarum) cincti. *Receptaculum* urceolatum, 1·6—2 mm. diametro, superne constrictum et ultra ovarii verticem in tubum brevem productum, anthesi circa stelem parenchymate comminuto magis minusve cavum, laeve. *Sepala* cum petalis plane patentia et persistentia, petaloidea, candida, interdum levissime roseo-suffusa, orbicularia vel elliptico-orbicularia, integra, 1·2—1·5 mm. longa. *Petala* orbicularia, basi breviter contracta, circiter 1 mm. diametro, colore sepalorum. *Stamina* 5, cum petalis alternantia ; antherae e filamento brevissimo cernuae, 0·6 mm. latae, purpureo-brunneae thecis alte liberis subglobosis, connectivo breviter elongato incurvo apice glanduloso superatis poro vel rima brevi dehiscentibus. *Discus* scutellaris, aurantiacus. *Ovarii* locus in receptaculo superiore situs et in eius cavitate quasi stipitatis, 2-ovulatus ; ovula collateralia, fere e basi orta, depresso-ellipsoidea, funiculo brevissimo, raphe in pulvinulum incrassata ; stylus vix 0·4 mm. longus. *Fructus* ignotus.

Thryptomene thymifolia is a small aromatic perfectly glabrous shrub with long slender main branches and shorter and still slenderer opposite branchlets which bear the bulk of the leaves and the flowers. The rather crowded and almost sessile leaves are inversely oblong from a shortly narrowed base, more or less blunt and flat, measuring 6 to 8 mm. by 1·5 to 2 mm. ; they are thinly leathery, dark-green and dotted with dark glands on both sides. The flowers are borne on very short slender curved stalks, either singly or in pairs. The receptacle has the shape of a short urn and is 1·6 to almost 2 mm.

* The name was probably meant to allude to the dainty or delicate appearance of the plant on which Endlicher based the genus, namely *T. australis*.

in diameter, with a distinct constriction in the upper part and a short tube above it ; it is neither ribbed nor pitted. The milk-white and almost orbicular sepals and the similar, but slightly smaller, *petals* spread flatly from the rim of the receptacle, the sepals being up to over 1.5 mm. wide. The 5 *stamens* alternate with the petals and curve inwards and downwards over the top of the ovary, their minute anthers consisting of two almost globular halves with a short horn-like incurved continuation of the connective above them. The 1-celled ovary which is immersed in the receptacle contains 2 ovules rising side by side from near the base.

DISTRIBUTION.—See below.

This is one of the numerous shrubs of the heather-type which are so characteristic of West- and South-Australia and often mimic each other bewilderingly in their general appearance, even including the flowers, although the more intimate structure of the latter may be very different. The specimen, a branch of which is depicted here, was raised at the R. Botanic Garden at Edinburgh from seed received from the Botanic Garden at Melbourne under the name *Thryptomene Mitchelliana* in 1920, but the earlier history of the seed is unknown. It is quite clear that, apart from reasons of nomenclature,* the name *T. Mitchelliana* is inapplicable, as the species to which that name was given has an elongated obconical receptacle and smaller more fleshy sepals and petals which are obliquely erect in the open flower and close up when maturing. The mistake is probably due to the resemblance of the foliage of the two species which is indeed considerable. The affinity lies rather with *T. tenella* and *T. urceolaris*, two West-Australian species having very similar flowers, but at the same time possessing small terete leaves with spinulous tips.

The genus *Thryptomene* comprises over 20 species, all natives of Australia. It is by no means uniform, and this has led to confusion with *Baeckea* and *Micromyrtus* and to the description of new genera which were subsequently sunk in *Thryptomene*. Even as late as 1905

* See footnote under *T. calycina*, two pages on.

we find Diels and Pritzel, who had an opportunity of studying the genus in the field, insisting on the obscurity of our conception of the genus and of its species. This obscurity resolves itself largely if we register the species by the groups in which they present themselves by the ensemble of their floral characters. The following key is intended to illustrate this as far as the more conspicuous features are concerned.

Stamens 10

Receptacle glaucous, obconical with deep longitudinal grooves, not produced beyond the top of the ovary; sepals spreading, scarious, rather large; petals loosely arching over the top of the ovary, at length scarious and closing up; sepals and petals persisting:

Sect. I. EU-THRYPTOMENE, comprising the species *mucronulata*, *australis*, *prolifera*, *Johnsonii*, *Dielsiana* and *aspera* (?); all West-Australian.

Receptacle glaucous, shortly top-shaped, pitted or with prominent confluent wrinkles, not produced above the top of the ovary; sepals more or less scarious, usually shorter than the petals, both spreading at the height of flowering, then the sepals sharply bent in over the top of the ovary whilst the petals erect themselves and are at length shed, never becoming scarious:

Sect. II. ASTRAEA (genus *Astraea*, Schauer; *Eremopyxis*, Baill.), comprising the species *saxicola*, *stenophylla*, *hyporhytis*, *denticulata*, *racemosula*, *blaeckeacea*, *strongylophylla*; all West-Australian.

Stamens 5

Receptacle glaucous, shortly top-shaped, longitudinally grooved, not produced beyond the top of the ovary; sepals and petals as in *Eu-Thryptomene* but smaller:

Sect. III. OLIGANDRON, only species *oligandron*; Tropical-Australian.

Receptacle pale green or purplish, smooth, urn-shaped, conspicuously constricted above and produced beyond the constriction into a short tube; sepals and petals spreading flatly, at length scarious, not closing up:

Sect. IV. THRYPTOCALPE, comprising the species *tenella*,* *urceolaris* and *thymifolia*; the first two West-Australian, the last of uncertain origin.

Receptacle dark-purple, oblong-obconical, mostly 5-ribbed, not or only obscurely constricted above, produced beyond the ovary into a short tube; sepals and petals obliquely erect in the open flower, closing up afterwards, never scarious:

* *T. tenella* was placed by Bentham in *Flora Australiensis* with the decandrous species; but in the text he says that the anthers had fallen off in the specimens examined by him. This is so, but the filaments are preserved, and there are always clearly only 5 of them present.

Sect. V. PARYPHANTHA (genus *Paryphantha*, Schauer), comprising the species *calycina*,* *Miqueliana*, *micrantha*, *ericea* and *Elliottii*; natives of South-Australia, Victoria, Tasmania and possibly New South Wales.

Beside the species included in the key above, thirteen more have been described as species of *Thryptomene*. As far as I have seen them or am able to interpret their descriptions they seem to me to be mostly referable to *Micromyrtus* or to represent types distinct from this genus and from *Thryptomene*. Of the sections recognised *Paryphantha* is the most aberrant and it may in the future have to be restored to generic rank.

Diels and Pritzel observe that most of the West-Australian species grow in loamy or half-loamy soil, others (in the interior) in more or less sandy soil or in pure sand. They often grow gregariously and associations of species having small linear or cylindrical leaves recall then our calluna-heath. *Thryptomene* requires greenhouse treatment, such as is given to *Leptospermum*, *Callistemon* and similar other Australian *Myrtaceae*. *T. thymifolia*, Professor W. Wright Smith writes, is a free-growing shrubby plant which will flower very freely if given plenty of sun to ripen the many young shoots produced during the summer months. As most of the other species also flower abundantly and the very pretty flowers last a long time, the genus deserves more attention than it has received so far in horticulture. O.S.

Fig. 1, a flowering branch, nat. size; 2, a part of a leafy branch, $\times 7$; 3, a flower, $\times 6$; 4, the same in longitudinal section, $\times 10$; 5, an anther, $\times 30$.

* This is the species on which Schauer based the genus *Paryphantha* (1843) and which he named *P. Mitchelliana* after its discoverer T. Mitchell, the Australian explorer. Ferdinand von Mueller transferred it subsequently to *Thryptomene*. The plant, however, was already described in 1839 by Lindley in Mitchell's "Three Expeditions into the interior of Australia," II. 190, as *Baeckea calycina*; hence my new combination. Lindley's and Schauer's specimens were collected by Mitchell in 1838 (22nd July) on Mount Arapiles, N.N.W. of the Grampian Mountains of Victoria, and he refers to them in his book as "a handsome evergreen bush, the ends of whose graceful branches were loosely covered with small delicate flowers." But there is another specimen of the same species in the Kew Herbarium from Cunningham's Herbarium with the annotation "New South Wales, Mitchell's Expedition, 1835." This was his expedition to the upper Darlington River which was entirely in what is at present the territory of New South Wales.

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TAB. 8996.

EPIDENDRUM CRISTOBALENSE.

Central America.

ORCHIDACEAE. Tribe LAELIINAE.

EPIDENDRUM, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 528; *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 144.

Epidendrum cristobalense, Ames, *Sched. Orchid.* No. 4. 38 (1923); affine *E. Laucheano*, Rolfe, sed floribus maioribus, sepalis petalisque latioribus magis obtusis et uti labellum crassissime carnosissimum distat.

Caules plures e rhizomate repente erecti, 30 cm. alti, foliosi, ultra medium teretes, deinde compressi vel omnino applanati et tunc ad 8 mm. lati. *Folia* ad 11 cum quoque caule, arcte vaginantia, vaginis internodiis longioribus saepe rubescentibus; laminae patentes, e basi rotundata amplexicauli linearilanceolatae, longissime in apicem acutum attenuatae, longiores ad 19 cm. longae, 8—13 mm. latae, coriaceae, rigidae, virides, costa facie impressa, dorso plana. *Racemi* e pedunculo caulem continente spatheato ultra 10 cm. longo penduli, multiflori, 30—50 cm. longi; spathae inferiores 3—4 virides, foliaceae, equitantes, linearilanceolatae vel lineares, acutissimae, 7—5 cm. longae, 5—6 mm. latae, summae admodum redactae, subulatae. *Flores* circiter 1 cm. distantes, crassissime carnosae, bracteis linearitriangularibus acutissimis 3—4 mm. longis suffulti. *Receptaculum* cylindricum, sursum paulo ampliatum cum pedicello brevi 6—7 cm. longum. *Sepala* elliptico-oblonga, basin versus paulo angustiora, apice rotundata, salmoneo-fulva, 9 mm. longa, 5—5.5 mm. lata, lateralia patentia, facie leviter convexa, summum erectum, facie leviter concavum. *Petala* spatulata, reflexa, ad 8 mm. longa, 2 mm. lata, eodem colore et substantia ac sepalis. *Labellum* late cordatum, e sinu unguiculatum, ungue pro maxima parte secundum margines columnae ita adnato ut tubus angustus efficiatur, lamina apice emarginata subconduplicata 8 mm. longa olivacea, callo mediano crasso laevi. *Columna* brevis, crassa, apice ad latera utrinque dente curvato brevi aucta. *Anthera* semiglobosa, breviter acuminata; pollinia 4, cerea, oblonga, ea cuiusque loculi per paria connexa, 0.35 mm. longa.

The slender or, when flowering, somewhat stouter *stems* of this orchid rise from a creeping rhizome to 20–30 cm., bearing up to 11 tightly sheathing *leaves* whose linear-lanceolate long-tapering blades stand out at approximately right angles; they are stiff, leathery, bright green and measure up to 19 cm. by 8 to 13 mm. The remarkably fleshy or waxy *flowers* are borne on pendulous racemes often of great length (30 to 50 cm.) which are supported by an erect peduncle sheathed in the lower part by 3 to 4 equitant leaf-like linear-lanceolate or linear spathes followed higher up by short, very narrow rudimentary spathes; the bracts at the base of the flowers are only 3 to 4 mm. long and narrowly lanceolate.

The *sepals* are elliptic-oblong, very obtuse at the tip and slightly narrowed at the base and measure 9 mm. by 5 to 5.5 mm., the uppermost being erect whilst the lateral spread downwards. The reflexed *petals* are spatulate, smaller than the sepals (8 mm. by 2 mm.), but of the same salmon-pink to tawny colour. The lip is olive-green, broadly heart-shaped and slightly notched, with the sides turned-up, smooth on the inside and 8 mm. long. The *column*, which is joined in the front to the lip, is short, stout and carries on each side of the anther a small curved tooth.

DISTRIBUTION.—Costarica, in hedges on the mountains round Cartago, between 1,500 and 2,400 m.

This quaint and very striking orchid was discovered by Mr. C. H. Lankester, to whom we owe so much of our recent knowledge of the flora of Costarica, in the hedges of the Matomora District on the north-western slope of the volcano Irazu in 1918. More recently it has also been found by him on the highland of San Cristobal to the south-west of Cartago. He sent specimens of the plant to Kew in 1920 and from one of them the present plate was prepared last year. The plants are grown in the intermediate house and share the general treatment of the orchids of that house. The flowers remained in good condition for several weeks.

The close affinity of our plant with *E. Laucheum*, which was introduced by F. Sanders & Co. over thirty years ago from, so it is assumed, Popayan in Southern Colombia, is evident, but their wider affinity is doubtful, except in so far as both species may be referred to Lindley's Division *Spathium*. The genus *Epidendrum* which numbers at present between 700 and 800 species of the most varying aspect, is in so chaotic a condition that it is idle to speak of affinities except within narrow groups.

O.S.

Fig. 1, habit-figure, $\times \frac{1}{3}$; 2, upper part of a flowering stem with the base of the raceme, nat. size; 3, upper part of the same raceme, nat. size; 4, flower in front view, $\times 2$; 5, flower in side view, with one half of the lip cut away, so that the callus is seen with the other half of the lip behind it, $\times 2$; 6, blade of the lip, flattened out, in back view, $\times 2$; 7, column with anther, $\times 5$; 8, an anther in front view, $\times 8$.

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TAB. 8997.

LAVATERA BICOLOR.

South Europe.

MALVACEAE. Tribe MALVEAE.

LAVATERA, Linn.; Benth. & Hook. f., Gen. Plant. I. 200; K. Schum. in Engl. & Prantl, Nat. Pflanzenf. III. 6. 39.

Lavatera bicolor, Rouy ("pro subspecie *L. maritimae* ") in Morot, Journ. de Bot. XI. 86 (1897) et ("subspec.") in Rouy & Foucaud, Fl. de France, IV. 46 (1897); *L. maritimae*, Gouan, arcte affinis, sed omnibus partibus multo laxius pilosis (minime pannosis), foliis multo maioribus viridibus vel subgriseo-viridibus profundius lobatis longius petiolatis, floribus maioribus.

Frutex ultra 1 m. altus, e ramis elongatis multiramulosus; rami ramulique iuniores virides, stellato-pilosi, vetustiores cinerascens, cortice demum minute reticulato-lamellato. *Folia* petiolo gracili tenuiter stellato-furfuraceo 2—7 cm. longo suffulta; lamina ambitu suborbicularis, basi cordata sinu ad 1.5 cm. alto vel subtruncata, ad $\frac{1}{2}$ (raro ultra) 5-lobata lobis superioribus late ovatis vel triangularibus acutis crenatis infimis brevioribus vel brevissimis, 3.5—7.5 cm. longa, 4—10 cm. lata, facie viridis vel subgriseo-viridis, pilis stellatis radiorum longitudine distantibus conspersa, dorso pallidior pilis magis approximatis, 5- vel sub-7-nervis; stipulae lineares, acuminatae, ad 8 mm. longae, caducae. *Flores* in axillis foliorum solitarii, raro geminati; pedicelli graciles, 2—3 cm. longi, maturitate ad 4 cm. accrescentes, indumento eodem ac ramuli; bractee epicalycis 3, brevissime connatae, elliptico-ovatae, acutae vel breviter acuminatae, 8—13 mm. longae, 4—7 mm. latae, subgriseo-virides, extra stellato-pilosae, intra praeter margines tomentosos pilis minutis parce pubescentes. *Calyx* campanulatus, 13—15 mm. longus, ad medium 5—10 mm. latus, lobis ovatis acutis vel apiculato-acuminatis, extra indumento epicalycis nisi pilis stellatis maioribus densioribus, intra glaber. *Petala* ima basi connata, ex ungue anguste cuneato ad 8 mm. longo cordato-obovata, eo incluso 3—3.5 cm. longa, 2.5—3 cm. lata, alba vel dilute rosea vel lilacina, ex ungue saturate purpureo basi ad margines dense albo-barbato pulchre longe purpureo-venosa. *Staminum* tubus ultra 1 cm. longus, purpureus, albo-hirtus; filamenta libera, atropurpurea, 4 mm. longa; antherae pallidae. *Stigmata* circiter 10, demum ad 1 cm. longa. *Carpophorum* post anthesin apice styli basi bulbosae incrassata carpella superante primo laevi tandem sulcata coronatum, maturum inter carpella cornuto-cristatum. *Mericaipia* pallida vel fusca, dorso utrinque acute carinata, ad latera et inter carinas magis minusve rugoso-nervosa. *Semina* reniformia, atro-fusca, 4 mm. longa. ? *L. bicolor* (nomen), Shuttlew. in Huet, Cat. Pl. Provence, 28 (1889); *L. maritima*, J. E. Planchon in Fl. des Serres, X. t. 1007 (1854—55), non Gouan.

This is an erect *shrub* from $\frac{1}{2}$ to over 1 m. high with long branches bearing numerous short branchlets, all, when young, like the foliage pale-green with a faint greyish hue owing to the presence of minute 6- to 10-rayed stellate hairs which stand apart by the length of the rays or little less. The *leaves* are borne on slender stalks 2 to 7 cm. long; their blades are approximately

round in outline with a truncate or cordate base and 5 broad acute crenate lobes, and they measure 3·5 to 7·5 cm. by 4 to 10 cm. The *flowers* rise singly (rarely in pairs) from the axils of the leaves and are carried on slender stalks 2 to 3 cm. long, their "outer calyx" consisting of 3 almost free elliptic-ovate acute bracts 8 to 13 mm. long. The *calyx proper* is bell-shaped, 13 to 15 mm. long and 5-cleft to or almost to the middle, the segments being ovate, acute and more or less apiculate; the colour and the hairs of the bracts and the calyx are the same as those of the leaves. The *petals* which are united at the very base are broadly heart-shaped with a long and slender claw which is densely fringed with white hairs at the base; they measure 3—3·5 cm. by 2·5 to 3 cm. and are white or delicately rose or mauve with long purple veins running from the dark purple claw into the blade. The *staminal tube* is dark-purple with white spreading hairs. The bulbously thickened *style* base persists and exceeds the carpels which surround it. The *fruitlets* are pale or dark, sharply keeled on both sides of the back and prominently veined between the keels and on the sides.

DISTRIBUTION.—French Riviera, near the Pont St. Louis on the Italian frontier.

This handsome plant seems to have been in cultivation for many years, mostly under no definite name. Canon Ellacombe sent it to Kew for identification thirty years ago and further specimens were received for the same purpose from other sources. The affinity with the Mediterranean *L. maritima* was early recognised and eventually its identity with a plant described by M. Rouy as *L. bicolor* was suggested. This identification was recently confirmed by M. Rouy when I submitted a specimen to him for comparison. From *Flore des Serres* (t. 1007), however, it is obvious that our plant was known in gardens long before it received the attention of the Kew botanists. The plant depicted there is evidently the same as the subject of this plate although the green of the foliage is too bright. Nothing is said about its origin in the accompanying text for which J. E. Planchon, then at Montpellier, was responsible, but it is probable

that the plate was prepared in Belgium from a plant grown there. However that may be, Planchon identified it with *L. maritima*, remarking at the same time that the leaves were rendered green in the plate by mistake and adding a Latin diagnosis which fits *L. maritima* as Gouan described it originally, but does not tally with the picture. He was evidently misled in believing the latter incorrect. To me it appears to be the work of a good artist and, apart from the too vivid green of the leaves, a faithful representation of our plant. A year later E. Morren published in Belgique Horticole VI. t.5. what seems to be a corrected version of the same plate, combining the flowers of the plate of the Flore des Serres with the foliage of the true *L. maritima*; but he too is silent as to the origin of the actual plant figured. According to Rouy, it was Aug. de Coincy, the author of "Eclogia Plantarum Hispanicarum," who found it growing wild at the Pont St. Louis near Menton on the French Riviera. He also adds that a plant collected by R. J. Shuttleworth at San Remo may be the same. It is enumerated without description, as "*Lavatera bicolor*, Shuttlew." in Huet's Catalogue of the Plants of the Provence (1889); but no specimen of *L. maritima* or *L. bicolor* from S. Remo can be traced in Shuttleworth's collection which was purchased by the British Museum in 1877. Now, typical *L. maritima* occurs at Menton and it is not uncommon all along the coast and its immediate hinterland of the French and Italian Riviera, and Moggridge has given us a good portrait of it in his Flora of Menton (t. 6). It is widely distributed in the western half of the Mediterranean coastlands, from the Bay of Genoa to Gibraltar and from Morocco to Tunis, but it is so uniformly distinct from *L. bicolor* within this area that the idea of the latter being merely a modification of it, conditioned by the peculiarities of its habitat, cannot be entertained; hence Rouy's conception of it as an elementary species ("subspecies" of *L. maritima*, as he terms it) and his application to it of a binomial name. Considering, however, the morphological differences and the fact that it has proved perfectly constant in cultivation for so long and under varying conditions, it seems sufficient and desirable for all practical

purposes to treat it simply as a species without any grading qualification, whatever its genesis may be. As to this we can only speculate at present. It may be a relict-species at the point of disappearing or a mutant of *L. maritima* or a stabilised fertile hybrid. Its occurrence even at the Pont de St. Louis may not be truly spontaneous, it being possibly an escape from a garden. All this will have to be examined on the spot; but whatever the result, it will not affect its horticultural value.

L. bicolor seems to be quite hardy in this country. At Kew it flowers till very late (November) in the year in the shelter of the eastern wall of the Temperate House. It is also treated as a pot-plant—the particular plant from which our drawing was made last May is such a pot-plant grown in the Temperate House for many years and not more than 5 dm. high. In this state it should be a welcome addition to the greenhouse, where it will flower for months without requiring more than ordinary attention. It seeds freely also out of doors, but it may also be propagated from cuttings. O.S.

Fig. 1, a flowering branch, nat. size; 2 and 3, hairs from the upper and lower sides of a leaf, showing density of arrangement, $\times 80$; 4, hairs from the edge of a calyx-lobe, $\times 80$; 5, claws of petals, $\times \frac{3}{2}$ (the hairs of the lower half of the claws should have been shown forming a dense fringe); 6, staminal column, $\times 2$; 7, an anther $\times 12$; 8, a pistil, $\times 3$; 9, an almost mature fruit, $\times 5$; 10, a fruitlet, $\times 3$; 11, a seed, $\times 3$.

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TAB. 8998.

CALLISTACHYS OVATA.

Australia.

LEGUMINOSAE. Tribe PODALYRIEAE.

CALLISTACHYS, Vent.; *Taub. in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 205 (pro parte). OXYLOBIUM, Benth. & Hook. f., *Gen. Plant.* I. 467 (pro parte); *Harms in Engl. & Prantl, l. c., Nachtr.* I. 200 (pro parte), non Andrews.

Callistachys ovata, Sims, *Bot. Mag. t.* 1925, emend. Stapf; arcte affinis *C. lanceolatae*, Vent., sed foliis latioribus oblongo- vel ovato-lanceolatis anthesi utrinque argenteo-sericeis, racemis valde contractis distincta.

Frutex ad 6 m. altus, ramis magis minusve rigidis teretibus leviter costatis vel lateralibus saepe compressis vel etiam subancipitibus viridibus sericeo-pubescentibus. *Folia* stipulata, petiolata, plerumque ternatim subverticillata, verticillis 3—4 cm. distantibus; lamina plerumque e basi acuta ovato-lanceolata, arcte acuminata vel ad oblongum vergens et tunc breviter acuta vel rarius obtusa, integerrima, mucrone molli subpenicillato terminata, 5—8 cm. longa, 1.2—2.5 cm. lata, subcoriacea, utrinque argenteo-sericea, facie tandem calvescens et demum saepe glabra et viridis, nervis utrinque circiter 9 intra marginem arcuatim iunctis, venis in rete minute areolatum facie prominulum contextis; petiolus 4 mm. longus, dense sericeus; stipulae persistentes, lineares, 4—6 mm. longae, saepe flexuosae, dorso sericeae, facie glabrae, basi petiolo adnatae et ibi cum eo in pulvinum sicco nigricantem confluentes. *Inflorescentiae* ramos terminantes, breviter racemosae, valde contractae, foliis superatae, pedunculo sericeo 15—5 mm. longo suffultae; bracteae caducae, lanceolatae, longe tenuiter acuminatae, ad 7 mm. longae, fusco-virides, dorso sericeae, facie glabrae; pedicelli 4—5 mm. longi, argenteo-sericei, apicem versus 2-bracteolati, bracteolis bracteis similibus nisi minoribus. *Calyx* persistens, alte 2-labiatus, 7—8 mm. longus, extra argenteo-sericeus, intra superne minute pubescens, caeterum glaber; labium superum breviter 2-lobum lobis latis obliquis; labium inferum alte 3-fidum, lobis ovatis, intermedio latiore; lobi omnes penicillato-apiculati. *Corolla* aurea vel subaurantiaca; vexillum late transverse ellipticum, fere reniforme, unguiculatum ungue 2 mm. longo, lamina circiter 7.5 mm. longa 1.2 cm. lata apice subemarginata basi rubro-striolata; alae oblique obovatae, fere truncatae, breviter unguiculatae et auriculatae, lamina 7.5 mm. longa et ad 4 mm. lata; carinae petala dorso connata, alis paulo breviora et iis similia. *Stamina* 10, libera, filamentis 8—9 mm. longis, antheris 1 mm. longis. *Ovarium* breviter stipitatum, oblongum, utrinque carinatum, albo-villosum, 8-ovulatum, endocarpio crasso interdum ob rugas transversas haud altas quasi undulato; stylus curvatus, glaber, circiter 5 mm. longus; stigma minutum, punctiforme. *Legumen* stipitatum, longe villosum, oblique oblongum, stylo coronatum, 11—13 mm. longum, 5—6 mm. latum, nigrum, apice tantum dehiscens; mesocarpium demum ad fasciculos vasorum transversos induratos venis laxo connexos redactum et ab endocarpio solubile; endocarpium durum, tenax, intra praeter tela subepidermalia ad rugas transversas obsoletas disrupta laeve. *Semina* oblique ovato-oblonga, vix reniformia, atra, nitida, 2 mm. longa, hilo annulo circumdato. DC., *Prodr.* II. 104 (1825); Don, *Gen. Syst.* II. 117 (1832); Spach, *Hist. Nat. Veget.* I. 172 (1834); Meisn. in Lehm., *Plant. Preiss.* I. 26 (1844). *Oxylobium Callistachys*, Benth., *Fl. Austral.* II. 16 (1864), (pro parte).

This is a *shrub*, up to 6 m. high, much branched and with dense foliage. The *leaves* are generally arranged in whorls of 3 and are silvery-silky all over or at length glabrous on the upper side; they are ovate-lanceolate or

almost oblong or lanceolate, taper mostly to a sharp point and measure 5–8 cm. by 1.2–2.5 cm.; their short silky stalks bear the persistent linear stipules near the base. The short compact *racemes* of bright yellow flowers terminate the branches and are more or less exceeded by the uppermost leaves; the dark lanceolate bracts are, like the similar but smaller bractlets, early deciduous and they are rather longer than the flower-stalks. The persistent *calyx* is 7 to 8 mm. long and deeply two-lipped with the upper lip shortly two-lobed and the lower deeply three-cleft; it is silvery-silky outside, but almost glabrous inside. The rounded notched *standard* is wider than high (7.5 mm. by 12 mm.) and marked with short red lines towards the clawed base; the wings and the keel are short and very blunt. The shaggy *ovary* is obliquely oblong and contains 8 ovules; the style is curved, glabrous, about 5 mm. long and terminated by the minute stigma. The oblong *Pods* are 11 to 13 mm. in length and long retain their silky-grey shaggy covering; they open only at the top whence they emit the small black polished *seeds* which are hardly more than 2 mm. long.

DISTRIBUTION.—West Australia (see below).

The genus *Callistachys* was founded by Ventenat on a plant grown in the garden of the Empress Josephine at Malmaison early in the last century. It had been raised from seed sent by Capt. Baudin from South-western Australia and was described and illustrated by him in his *Choix des Plantes de Malmaison* in 1803. A similar plant seems to have been distributed from the same source and to have reached this country about twelve years later. It was figured in this Magazine on t. 1925 under the name *C. ovata*. It is represented as having green, apparently soft and loosely hairy obovate-lanceolate or obovate leaves with short cusps or points, sufficiently distinct from those of the plant figured here to arouse doubt as to its identity. As no specimens of this original *C. ovata* have been preserved and the extremely meagre description adds nothing to the characters exhibited in the figure, it might seem that *C. ovata* would have to remain a doubtful species. The study, however, of specimens collected by R. Brown about

the same time and in the same area has convinced me that it is reasonable to treat the plants in question as conspecific and to establish the species of the Botanical Magazine definitely by an emended description. R. Brown obtained the specimens referred to, which are indeed very similar to the subject of this plate, in King George's Sound in December, 1801 (distr. 4,006), and he described them in his MS. notes under the very appropriate name *Calistachya argentea*,* reserving the specific name *lanceolata* for Ventenat's plant which he had collected too (No. 4005). Almost forty years later Ludwig Preiss found our plant at Albany in what was then the Swan River Colony, and Meisner, in his elaboration of Preiss's plants, referred it to *C. ovata*. It has since been repeatedly collected in that area and the plant depicted here has no doubt the same origin. It was raised by Major A. A. Dorrien-Smith from seed received by him from the collector J. Staer of Waroonga, near Sydney, in 1911.

Major Dorrien-Smith grows *C. ovata* at Tresco Abbey, Isles of Scilly, and finds it hardy in favoured localities. It grows to a height of 5 to 6 m. and flowers almost throughout the year, but is most perfect in July. In most parts of this country, however, *C. ovata* will no doubt require the shelter of the greenhouse where the silvery foliage and the rich golden colour of the flowers will be most welcome. Its treatment is that of heather. According to Major Dorrien-Smith this is the "Cattle Poison Plant" of West-Australia, a name which is no doubt also applied to its close congener *C. lanceolata*. The poisonous principle is probably the same as that which also renders species of allied Australian genera, such as *Oxylobium*, *Gastrolobium*, etc., dangerous to cattle.

Bentham, in *Flora Australiensis* and in *Genera Plantarum*, merged *Callistachys* in *Oxylobium*, and later authors have generally followed him. *Oxylobium*, however, was based by Andrews on a plant of very different habit and possessing pods that split to the base. Andrews figured it in his *Botanist's Repository* (t. 492), and a further picture of it may be found in the *Botanical Magazine*, t. 1544. Bentham himself has admitted that *Callistachys* differs in the

* R. Br. in his notes also described an *Oxylobium argenteum* from Tasmania. This he published subsequently as *O. ellipticum*.

peculiar dehiscence of its pods from all other species of *Oxylobium*, and Diels and Pritzel have pointed out more recently that it occupies an altogether isolated position in that rather artificial genus. Now the dehiscence of *Callistachys* is not merely a case of more or less splitting. The union of the carpel-sutures below the mouth through which the seeds are emitted is so complete that it is easier to break the pod than to force it to open along the lines along which the *Oxylobium*-pod splits. Taking this character and the general habit of *Callistachys* into consideration, I prefer to adhere to the earlier view according to which *Callistachys* and *Oxylobium* are treated as generically distinct. *Callistachys* in that sense is confined to the south-western part of West-Australia and limited to two or three species, *C. lanceolata*, *C. ovata* and possibly *C. elliptica*,* a very imperfectly known species proposed by Ventenat.

It is frequently stated in literature that *Callistachys* possesses pods which are incompletely chambered by the "intrusion of cellular tissue which often dries up into partial transverse dissepiments" (Bentham). The actual conditions which have led to this interpretation are these. The cavity of the ovary is lined with a thick fleshy tissue, the outer part of which subsequently forms the hard and extremely tough endocarp. This lining bulges here and there slightly between the ovules, forming very obscure transverse ridges. The ridges become no more prominent on maturing, but the epidermis and the sub-epidermal thin-walled layers not being able to keep pace with the growth of the fibrous layer underneath break up into irregular flakes or tear transversely along the ridges, in which case the loosened edges may protrude into the cavity of the pod between the seeds. In any case no transverse septa are formed. O.S.

Fig. 1, flowering branch, nat. size; 2, upper half of calyx, $\times 3$; 3, lower half of calyx, $\times 3$; 4, standard, $\times 2$; 5, wings, $\times 2$; 6, keel-petals, divided, $\times 2$; 7, pistil in longitudinal section, $\times 5$; 8, transverse section through pistil, $\times 12$; 9, mature pod, nat. size; 10, pod, showing skeleton of the mesocarp, $\times 2.5$; 11, seed, $\times 9$.

* This has been identified by Bentham with *Oxylobium ellipticum* of R. Brown; but if a specimen in Gay's herbarium (now at Kew) from the Jardin de Luxembourg (S. VI. 1822) and written up as *C. ellipticum*, Vent., can be relied upon, Ventenat's plant is not conspecific with R. Brown's *Oxylobium ellipticum*, but congeneric with the original *Callistachys*. It may be the plant figured as *C. retusa* in Loddiges's Botanical Cabinet, t. 1983 (not to be confused with R. Brown's *O. retusum*).

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TAB. 8999.

COTONEASTER SALICIFOLIA.

China.

POMACEAE. Tribe CRATAEGEAE.

COTONEASTER, *Medik.*; *Benth & Hook. f., Gen. Plant.* I. 627; *Focke in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 21.

Cotoneaster salicifolia, *Franch. in Nouv. Arch. Mus. Paris*, ser. 2. VIII. 225 (1886) et *Plant. David.* II. 43 (1888); arcte affinis *C. rugosae*, Pritzl, sed foliis anguste lanceolatis in dorso etiam maturitate tomentosis, floribus fructibusque minoribus, hisce semper globosis vel leviter depressis, pyrenis minoribus minus obtusis differt.

Frutex 4—6 m. altus, diffusus, ramis longis gracilibus arcuatis magis minusve horizontalibus, iunioribus ipsis praeter apices pubescentes glabris cortice atro-rubro laevi vel purpureo parce lenticellato tectis. *Folia* petiolata, persistentia; lamina anguste lanceolata, utrinque acuta, ad marginem recurva, 5—7 cm. longa, 1—2 cm. lata, rarius latior, subcoriacea, utrinque minute reticulato-rugosa, facie saepe in gemma ipsa glaberrima vel saltem citissime glabrata, lucidula, dorso diutissime albo-floccoso-tomentosa, in rugulis minute papillosa, nervis utrinque 12—14 obliquis facie impressis dorso prominentibus; petiolus 3 mm. longus, facie sulcatus et pubescens, dorso ruber, glaber; stipulae anguste lineari-lanceolatae vel subulatae, rubescentes, deciduae. *Corymbi* brachycladia 2—4 cm. longa 3—4-foliata terminantes, multiflori, 3—4 cm. lati, incano-villosuli; pedicelli ad 3 mm. longi; bractae minutae, filiformes. *Receptaculum* turbinatum, 2 mm. altum, incano-villosulum. *Sepala* late triangularia, intra glabra. *Petala* patentia, rotundata, breviter lateque unguiculata, 3 mm. diametro, alba, glaberrima. *Stamina* 20, filamentis maioribus ad 3 mm. longis, antheris atro-rubris. *Carpella* 2 vel 3 (rarius 4), usque ad medium dorsum receptaculo adnata, facie libera, vertice villosula; styli 2.5 mm. longi, glabri; ovula 2, e basi loculi collateralia. *Fructus* globosus, 5—7 mm. diametro, laete ruber, sepalis filamentis nigricantibus incumbentibus coronatus; pyrenae 2 vel 3 (rarius 4) ambitu ellipticae, 3 mm. longae, 2 mm. latae, obtusae vel subacutae et apiculatae, dorso a medio liberae. *Rehder and Wils. in Sargent, Pl. Wilson.* I. 172 (1912). *C. salicifolia* v. *floccosa*, *Rehder & Wils. l.c.* 173; *C. Schneider, Handb. Laubholz.* II. 1,004 (1912); *V. Gibbs in Gard. Chron.* LXIX. 7, fig. 4 (1921); *Thatcher in Gard. Chron.* LXXI. 115, fig. 56 (1922).

A *shrub*, about 4–6 m. high with slender widely spreading and arching branches which are quite glabrous except at the very tips and covered with a smooth dark-red bark. The narrow lanceolate *leaves* are about 5 to 7 cm. long and 1 to 2 cm. wide; they are delicately rugose on both sides and traversed by 12 to 14 pairs of slanting nerves deeply sunk on the slightly glossy, deep-green and glabrous upper side, but prominent on the lower side which is covered with a permanent woolly felt of white hairs; the leaf-stalks are very short and

in the young state flanked by awl-shaped or very narrowly lanceolate stipules of about twice their length. The many-flowered downy *corymbs* terminate short 3- to 4-leaved branchlets and are 3 to 4 cm. across. The *receptacle* is shortly top-shaped, 2 mm. high and externally greyish-downy like the triangular sepals which are up to 1 mm. long. The white glabrous rounded *petals* spread horizontally and measure about 3 mm. in diameter. There are 20 *stamens*, the longest filaments slightly exceeding the styles; the anthers are dark-red. The 2 or 3 (rarely 4) *carpels* are free on the face, but united with the receptacle on the back up to the middle and downy above it. The bright-red globose *fruits* measure 5 to 7 mm. across, the persistent sepals inclining over the dried-up black filaments; the stones are elliptic in outline with a blunt or minutely pointed top and measure 3 mm. by 2-2.5 mm.

DISTRIBUTION.—Western Szechuan, Mupin and Mt. Omei and Wenchuan Hsien, 2,300-3,000 m.

Cotoneaster salicifolia belongs to a group of species—all natives of the upper and middle basin of the Yangtse—of the section *Chaenopetalum*, the group being characterized by evergreen narrowly or broadly lanceolate, acute, moderately large leaves with nerves, which are deeply impressed on the upper side, and with a very fine net-work of veins whose minute meshes bulge so as to render both surfaces of the leaf delicately rugose; but whilst the epidermis of the upper surface is smooth and in the mature state mostly glabrous, that of the lower side is always more or less minutely papillose and, with the exception of *C. glabrata*, densely felted, the felt of hairs either persisting or at length disappearing to varying degrees. Their many-flowered corymbs are borne on short leafy spurs and often produce a large crop of bright-red fruits with 2-4 stones. This group includes, in addition to our species, *C. rugosa* (with *C. Henryana* as a synonym), *C. rhytidophylla* and *C. glabrata*, and one or two more species may have to be added from the unnamed material at Kew. Our plant was discovered by Père David at Mupin in 1869. Wilson in 1908 collected it in the same locality and also in the

Wen-chuan district about 110 Kil. N.N.E. of Mupin at altitudes of 2,300–3,000 m., having recorded it previously (1904) from Mt. Omei, S.S.E. of Mupin. In 1909 the Arnold Arboretum distributed seeds of the Mupin plant under No. 1333 and of the Wen-chuan plant under No. 1333a, the numbers quoted in "Plantae Wilsoniana" under *C. salicifolia* and *C. salicifolia* var. *floccosa* respectively.

Judging from the material that has come under my observation, field-specimens as well as cultivated specimens, I can see no tangible difference between those two plants. M. Gagnepain, of the Museum d'Histoire Naturelle at Paris, was good enough to compare portions of the branches depicted here with the original of Franchet's *C. salicifolia* and he assures me that they agree with the latter in every respect. Rehder and Wilson point out that Wilson's Mupin plant (1133) has two-stoned fruits whilst that from Wen-chuan has fruits with three stones; but Franchet's original, a flowering specimen, with which Wilson identifies his No. 1133 is described as having three styles. Further I find that the number of stones varies in Wilson's specimens from two to four in the same corymb, two and three being only the most frequent numbers respectively. The size of the fruit is another variable element in the species as it is conceived here; but it is constant in the individual, so that large- and small-fruited shrubs may be distinguished. This suggests the presence of definite fruit-strains; but I have to observe that Wilson 1133a from the Arnold Arboretum has produced small fruits at Kew, while the same number from the same source has given M. Chenault,* of Orleans, large fruits. Further observations on material whose numbering has been carefully checked are required to settle this point which is of some importance for the grower who will otherwise have to rely on vegetative propagation for the preservation of those fruit-types. There is no correlation between

* Professor D. Bois, to whom I applied for information concerning the range of variation of these forms in France and who obliged me by the remission of specimens from M. Chenault's nursery at Orleans, writes that M. Chenault assures him that the seeds of those cotoneasters never gave him variations and that in his experience the species and varieties of cotoneaster generally are quite stable, even if grown in close proximity, whence he concludes that they are self-fertile.

the size of a fruit and the number of its stones, but twin-stones are, as might be expected, broader and blunter at the top than triplet- or quadruplet-stones.

C. K. Schneider was inclined to consider Franchet's plant as identical with Pritzels *C. rugosa* (see Bot. Mag. t. 8694), but this differs from *C. salicifolia* in the shape of the leaves, the occasionally complete evanescence of the hair-felt on their underside, the larger and frequently inversely ovoid fruits and their larger, nearly always paired and very blunt stones, not to mention certain more minute anatomical characters of the leaf-epidermis. *C. rugosa* also appears to have a distinct distribution, having been found so far only in Western Hupeh and the adjoining parts of Szechuan, as far as Nan-chwan (south of the Yangtse). It includes *C. Henryana* (from the same area) as represented by the field-specimen quoted by Rehder and Wilson as its "type" and by the other specimens cited by the authors.

We are indebted to the Marquis of Headfort for the communication of the material from which this plate has been prepared. He has had the plant in his collection at Kells, Co. Meath, Ireland, for the last six years, having received it originally from the Botanic Gardens at Glasnevin, where it had been raised from seed distributed by the Arnold Arboretum in 1909, but whether from Wilson 1133 or 1133a—both are in cultivation at Glasnevin—cannot be ascertained now. *C. salicifolia* is perfectly hardy in this country as well as in Ireland and it has, as the Hon. Vicary Gibbs informs us, stood a frost of -18° C. in his garden at Elstree, Hertfordshire, without suffering any injury. It also thrives well in the severer climate of the interior of France. Its graceful habit and its copious crops of brilliantly coloured fruits, combined with a high degree of vigour and hardiness ought to make this shrub a common ornament of gardens.

. O.S.

Fig. 1, a young leafy shoot, nat. size; 2, a portion of a flowering branch, nat. size; 3, a flower without the petals $\times 6$; 4, a petal, $\times 6$; 5, a receptacle with stamens and pistils in longitudinal section, $\times 6$; 6, a fruiting branch, nat. size; 7, a fruit in longitudinal section, $\times 4$; 8, a stone in back- and in face-view, $\times 4$.

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TAB. 9000.

AMORPHOPHALLUS CIRRIFER.

Siam.

ARACEAE. Tribe AMORPHOPHALLEAE.

AMORPHOPHALLUS, *Blume*; *Benth. & Hook. f., Gen. Plant.* III. 970; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* II. 3. 126 et in *Pflanzenreich*, IV. 23c. 61.

Amorphophallus cirrifer, *Stapf (sp. nov.)*; inter omnes species generis organis neutris (staminibus mutatis) filiformibus basi bulbosis inter spicam femineam et masculam creberrimis necnon varie cum pistillis et staminibus et supra spicam masculam ipsam et in appendice ipso ortis insignis, his notis prototypum subgeneris novi nomine "*Metandrium*" salutandi constituens.

Tuber oblongo-ellipsoideum, albidum, 9 cm. longum, 4·5 cm. diametro. *Folium* solitarium, petiolo circiter 12 cm. longo basi cataphyllis membranaceis paucis acutis (summo angusto ad 9 cm. longo) cincto purpureo- et albomarmorato suffultum; lamina 3-secta, segmentis ad 25 cm. longis dichotomis infra et supra dichotomiam pinnatisectis, pinnis inferioribus 2-vel 4-nis ad 7 cm. longis superioribus valde inaequalibus, maioribus ad 13 cm. longis ad 5 cm. latis, omnibus elliptico-oblongis vel oblongis longe tenuiter acuminatis basi acutis (rarius obtusis) et magis minusve in rhachi decurrentibus margine crispulis. *Pedunculus* basi cataphyllis 4 cinctus, circiter 3—4 cm. longus, 5 mm. diametro, viridis; cataphylla superiora lineari-oblonga, purpurascens, summum ad 9 cm. longum. *Spatha* basi in tubum obovoideum 2—3 cm. altum 2·5—3·5 cm. latum convoluta, ad tubi ostium constricta, deinde in laminam ostium cingentem late ovatam acute acuminatam angulo fere recto patentem 7—11 cm. longam 5—7·5 cm. latam explanata; tubus extra albidus vel virescens et rubro-venosus, intra in fundo atro-purpureus et corrugatus vel verrucosus, ostium versus albomarmoratus; lamina in dorso luride vinosa necnon viridi-maculata, in facie antice ad latera rubro- vel fusco-purpurea et albo-maculata, caeterum atro-vinosa et hincinde rubro-maculata. *Spadix* longissime exsertus; a basi florifera; inflorescentia cylindrica 3—3·5 cm. longa, fere 1 cm. diametro, parte inferiore ♀ 8—13 mm. longa copiose crinita, parte superiore ♂ 20—22 mm. longa sparse vel sparsissime crinita, zona intermedia neutra 2—2·5 mm. longa bene crinita. *Flores* ♂: stamina plerumque 5-na in acervulos flores constituentes disposita vel sine ordine inferne arcte superne laxius aggregata; antherae sessiles, ambitu irregulariter ellipsoideae vel prismaticae, 0·7—0·8 mm. longae, apice obtusissimo poris 2-nis linearibus saepe confluentibus et tunc lunatis purpureo-marginatis dehiscentes. *Flores* ♀: ovarium sessile, globosum vel ellipsoideum, plerumque subbilobum, 1—1·2 mm. altum, albidum, 2-loculare; stigma sessile, discoideum, orbiculare vel suborbiculare, cinereo-papillosum, centro apiculo minuto atro vel apiculis 2—nis excentricis notatum et sulco ex apiculo ad marginem currente magis minusve imperfecte 2-lobum; ovulum solitarium, e basi loculi ascendens. *Organa neutra* e basi bulbosa criniformia, ad 1 cm. longa, flexuosa, patentia, purpurea, in spica ♀ 1—4 cum ovario quoque, in zona intermedia saepe in acervulos more staminum aggregata. *Appendix* e basi ampliata ad 3 cm. crassa subulatim attenuata, 15—40 cm. longa, curvata vel flexuosa, ascendens vel angulo recto patens.

A. cirrifer possesses a whitish tuber of the size and shape of a small fist which produces when full grown

an inflorescence followed by a solitary leaf after which a prolonged resting period sets in. The *leaf* is borne on a stalk about 12 cm. high and prettily mottled with purple and white. The blade consists of 3 forked segments bearing long and finely acuminate elliptic-oblong or oblong leaflets increasing in size upwards, the longest measuring up to 13 cm. by 5 cm. The *inflorescence* is raised above the ground 2 or 3 cm.; its spathe is twisted below into an inversely ovoid tube 2 to 3 cm. high and as wide or slightly wider and expanded above it into a broadly ovate acuminate blade which clasps the mouth of the tube completely and stands off almost horizontally; it measures 7 to 11 cm. by 5 to 7.5 cm.; for its complicated colouring we refer to the plate. The *spike proper* is shortly exerted from the spathe-tube and continued into a curved or flexuous dark livid-purple *appendage* which tapers from a more or less inflated base (1.5 to 3 cm. wide) to a long drawn out point and attains to up to 40 cm. in length, forming an obtuse or almost right angle with the spike proper; the female (lower) and male sections of the spike are 8 to 13 mm. and 20 to 22 mm. long respectively and separated by a very short neuter zone; this and the female section bear numerous purple hair-like processes up to 1 cm. long and spreading horizontally, such processes also occurring sparingly in the male section and on the appendage. The *male flowers* are reduced to sessile anthers which open by terminal purple-edged pores and are often grouped into clusters of 5 or arranged more or less irregularly. The *ovaries* are sessile, globose and crowned by a sessile disc-shaped stigma with a dark centric or two excentric dark points.

DISTRIBUTION.—Siam, probably near Bangkok.

This quaint species was received at Kew from Dr. Kerr of Chiangmai, Siam, in 1922 with the note "Bangkok." It flowered first in the middle of April of this year when the drawing reproduced here was made, the inflorescence being succeeded by a solitary leaf. Other tubers of the same consignment have so far produced only leaves except one which flowered at the end of April, the inflorescence being exactly like the first but for its

considerably larger size.* Whilst the general appearance of the inflorescence as well as that of the leaf is distinctly of the *Amorphophallus*-type, the presence of numerous thread-like spreading bodies with bulbous bases between the male and female sections of the spike and, to a lesser extent, within those sections and sparingly also above them is distinctly a feature not observed so far in the genus, unless we accept them as homologous with the hair-like "emergences" of the appendix of *A. hirtus*. Their occasional arrangement in a whorl around the pistil and in clusters in the interval between the male and female sections of the spike, when in arrangement they resemble the clusters of stamens in the male section, demonstrates their staminodial nature although the modification has gone very far indeed. They also occur sparingly towards and on the base of the appendix and even higher up on the latter. This is not surprising if we consider that the inflorescences of the *Amorphophalleae* show, above the female spike, a complete series of transitions from purely male spikes to spikes male in the lower part and barren above, either (1) with the male flowers or their stamens replaced by "emergences"—more or less club-shaped, prismatic or discoid (*Pseudohydrosme*, *Thomsonia*, *Pseudodraconium*)—or (2) with the male flowers altogether suppressed and the barren part transformed into an "appendix" often considerably differentiated from the part which has retained its sexual functions. Engler has also claimed, probably rightly, staminodial character for the loosely scattered hair-like emergences of the appendix and of the neutral interval of the spike of *A. hirtus*, a Formosan species described by Mr. N. E. Brown. However in none of those instances have the emergences been observed to occupy positions which mark them so clearly as staminodes as in *A. cirrifer*, particularly in the female section of the spike. It appears therefore that the female spike of *A. cirrifer* has preserved traces of the hermaphroditism of the more primitive genera of the *Amorphophalleae*, whilst the

* The dimensions of this second inflorescence were:—length of the tube of the spathe 3 cm. ; blade of spathe 10 cm. by 7.5 cm. ; length of the spike up to the appendix 3.5 cm. ; length of the appendix 39 cm. ; greatest width of the same 3 cm.

remainder of the spike has experienced as complete a differentiation into a sexual and an asexual part as any of the *Amorphophalli*. It may next be asked whether *A. cirrifer* should not with *A. hirtus* be placed in one section or subgenus (*Dysamorphophallus*, Engl.) ; but to my mind the facies of the two plants is so different as to suggest evolution on other lines. I consider with Engler the sections *Dracontiopsis* (West-African), *Hydrosme* (Tropical African), *Cundarum*, including *Cundaropsis* (Indo-Malayan) as natural geographically delimited groups within the genus. To these I would add *Synanthrias*, including *Raphiophallus* (Deccan and Ceylon). The bulk of the genus, however, corresponding to Engler's section *Conophallus*, with the monotypic groups *Rapyonkos* and *Interruptiflorus* thrown in, requires further scrutiny before we can speak of it as a homogeneous phylum. It is within this section that we may expect a linkage with our plant and with *A. hirtus*.

A. cirrifer is grown at Kew along with other amorphophalluses in a warm range with a minimum temperature of 15 to 16° C. (60° F.). The inflorescences remain open about a week whilst the leaves which unfold very slowly last over two months. They emit like those of other species of the genus a somewhat offensive fetid smell.

O.S.

Fig. 1, a tuber, $\times \frac{1}{3}$; 2, a leaf, $\times \frac{1}{3}$; 3, a leaflet, nat. size ; 4, an inflorescence, nat. size ; 5, half a spathe, seen from within, nat. size ; 6, a spadix with the appendix cut off, nat. size ; 7, a crowded cluster of anthers, $\times 5$; 8, an anther from a loose cluster in side view, $\times 10$; 9, the same in top view, $\times 10$; 10, a cluster of staminodes from the "neutral" zone, $\times 10$; 11, a whorl of staminodes, surrounding the scar of a pistil which has been cut out, $\times 10$; 12 and 13, pistils with odd staminodes, $\times 6$; 14, a pistil in top view, $\times 10$; 15, the same in section, $\times 10$.

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TAB. 9001.

RHODODENDRON CALOSTROTUM.

Burma.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, *Linn.*; *Benth. & Hook. f., Gen. Plant.* II, 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.*, IV, 1. 35.

Rhododendron calostrotum, *Balf. f. in Not. Bot. Gard. Edinb.* XIII, 35, 242 (1921); *R. prostrato*, W. W. Smith (v. Bot. Mag., t. 8747) et *R. charidoti*, Balf. f. et Farrer, sed ab utroque foliorum setis paucioribus diutius persistentibus, pedicellis evillosis, corolla paulo maiore fere rotata necnon ramulorum pedicellorumque squamulis pro parte longiuscule stipitatis distinctum.

Fruticulus nanus, 5—20 cm. altus, interdum solo adpressus et tunc ramis florentibus solis erectis; rami primo flavidi, dense hirsuti et insuper squamis longe stipitatis vestiti, deinde glabrati, rufescentes vel cinerascetes. *Folia* brevissime petiolata; lamina elliptica vel oblongo-elliptica, basi obtusa, apice rotundata et interdum minute apiculata, margine subrecurva, ad 1.5 cm. longa, rarius longior, ad 1 cm. lata, subcoriacea, facie primo subglaucoviridis, deinde atro-vel fusco-viridis vel hieme russo-olivacea, pallide lepidota squamulis magis minusve contiguis neque imbricatis, dorso primo griseo-salmonaea, demum ferruginea, imbricatum lepidota squamulis aliis sessilibus aliis stipitatis, margine setoso-ciliata ciliis 1—1.5 mm. longis. *Gemmae fertiles* terminales, ovoideae, obtusae; perulae rotundato-ovatae, extimae olivaceo-virides, apice foliosae, dense lepidotae, superne setoso-ciliatae, intimae demum cinnamomeae, cum bracteis similibus longe persistentes. *Flores* plerumque 2-ni, pedunculo brevissimo inter pedicellos setas nonnullas crassiusculas flavidas gerente suffulti; pedicelli graciles, circiter 1.5 cm. longi, rubro-purpurascetes, squamis aliis subsessilibus aliis stipitatis vestiti. *Calyx* late cupularis, ad 8 mm. longus, alte 5-partitus, extra basi dense albo-lepidotus; lobi late ovati, obtusi, superne late rubro-purpurascetes, dorso ad medium lepidoti, caeterum pilosuli et molliter rubro-ciliati. *Corolla* fere rotata, 4—4.5 cm. diametro, rosea vel roseo-purpurea, postice parce purpureo-maculata, antice ad 5, postice ad 8 mm. a basi partita, extra tenuiter pilosula, intra in fundo dense brevissime pubescens; lobi late rotundati, subrenulati, circiter 1.5 cm. lati. *Stamina* 10; filamenta rubro-purpurea, longiora ad 9 mm. longa, omnia supra basin per 2 mm. dense penicillato-villosa, villis purpureo-lilacinis; antherae ferrugineae, 3.5 mm. longae. *Ovarium* ovoideum, viride, imbricate lepidotum, 5-loculare; stylus rubro-purpureus, 13—14 mm. longus, leviter curvatus, glaber vel ima basi pilosulus; stigma discoideum, minute lobulatum. Stevenson, Rhod. F. K. Ward, 14, 21 (1923); Wilding, Rhod., 14 (1923).

A dwarf *shrublet* with more or less intricate branches which when quite young are densely covered with yellowish chaff-like hairs, intermixed with sessile and with stipitate scales. The very shortly stalked leathery *leaf-blades* are oblong-elliptic and blunt or rounded at both ends with the margins slightly recurved and ciliate, and they measure about 1.5 cm. by up to 1 cm.; they are at first light green or almost glaucous on the face with

numerous scales, turning eventually dark-green or in the winter russet, whilst the reddish-brown back is covered with a close layer of scales, partly sessile and partly stipitate. The *flowers* arise mostly in pairs from short egg-shaped olive-green buds, the innermost of whose scales persist long together with the similar bracts at the base of the pedicels; these are about 1.5 cm. long and covered with a white scurf. The cup-shaped *calyx* is about 8 mm. long and densely white-scaly in the lower green part, whilst the broad-ovate lobes are purplish upwards and finely downy towards the margins and softly ciliate. The large almost flat *corolla-limb* (4 cm. diameter) is placed more or less vertically with the longer of the 10 stamens (filaments 8–9 mm. long) and the purple style (13–14 mm. long) jutting out from it; it is, like the wide shallow base of the corolla, pink with a flush of purple that increases with age, finely and loosely downy outside and delicately velvety at the base inside. The red-purple *filaments* bear a dense tuft of soft lilac hairs near the base. The 5-celled *ovary* is green and densely covered with whitish scales.

DISTRIBUTION.—North-east Burma; alpine zone of the Irawadi-Salween watershed and its outlying spurs, 3,700–4,000 m., at about 26 N. Lat.

In the Gardeners' Chronicle of November 22nd and December 6th, 1919, Reginald Farrer gives a vivid account of his visit to that part of the Irawadi-Salween watershed which towers east of Hpimaw in Upper Burma at about 26° N. Lat. He tells us how, on having passed through a succession of high-forest, jungle and bamboo-brake, he reached, on the 24th of June, the zone of the dwarf high-alpine rhododendrons near the summit of Hpawshi Bum at an altitude of over 3,700 m. Three rhododendrons, he says, are "all over the open brows and rocks." The third of them is the one figured here from a specimen raised from seed collected by him (F. 1045). It "covers the barest open braes and tops of moorland in a close flat carpet of dark foliage, from which, on pedicels (in pairs) of an inch or so, rise large round blossoms of a rich warm magenta-rose. The whole plant recalls the obvious cousin *R. Kamtschaticum*,

but the flower is of a far pleasanter shade and is further set off by the brown reverse of the leaves and the vivid milky glaucescence of the young shoots. Now that *R. Chamaecistus* has become *Rhodothamnus*, this lovely plant, alike for colour and habit ought, if permitted, to take the name." Farrer was not aware that by the time he wrote the plant had already received a name of its own, "*calostrotum*" (the beautifully spread-out one), it having been discovered five years earlier by Capt. F. Kingdon Ward on the granite ridge of Imaw Bum (4,000 m.) about 20 miles to the north-west of Hpawshi Bum. Ward refers to it in his latest book "The Romance of Plant Hunting," p. 61, in these words "The most exciting plant found on the south slope, however, was the pigmy rhododendron with the giant flowers, *Rh. calostrotum* (K.W. 3390). This odd and tricky plant I had discovered in 1914. In 1919 I secured seed of it and the plants are due to flower in 1924. The thin wiry stems sprawl flat on the stone, forming a thin mat whence rise the 1-inch flower stems in pairs, each stem ending in a large flower of brilliant purplish crimson hue. The five-lobed corolla, which exceeds an inch in diameter, stands on edge, and is flattened till there is scarcely any tube left. Altogether a remarkable and brilliantly showy plant, . . . one for the rock garden or nowhere." The large widely open almost flat corollas of *R. calostrotum* recall indeed, as Farrer thought, the flowers of *R. kamtschaticum* (now *Therorodium kamtschaticum*) and of *Rhodothamnus Chamaecistus*, but the similarity is superficial, and the affinity lies really with about a dozen rhododendrons which group round Franchet's *R. saluenense* and are confined to the high mountains between the Upper Irawadi and the Upper Yangtze. Of these few are in cultivation and only one, *R. prostratum*, has so far been figured in this work (t. 8747). The comparison of that plate with the present picture brings out very vividly the great resemblance of the two species even if we admit that the plate over-emphasizes it by the omission of the dense soft shaggy covering of the pedicels and the exaggeration of the size of the flowers, the latter measuring rarely more than 3 cm. in diameter. The similarity between *R. calostrotum* and *R. charidotes* (collected by Farrer in the

same range of mountains but somewhat farther north) is equally great. In fact the "affinities" existing between the members of this group, as of other groups or series of *Rhododendron*, are so close as to be bewildering, and one wonders how the tangled skein of forms will be unravelled. Further collections may help towards that end, but unless they are supported by methodical observation in the field, they will as often add to the perplexity of the botanist as they will resolve it. It is more likely that well planned experiments carried on through a few generations of rhododendrons will shed light on the problem, and what more beautiful material could the experimenting gardener desire than the astounding wealth of forms and colours which has been evolved among the rhododendrons of the Chinese west. Meanwhile we shall have to accept the "microspecies" of Isaac Balfour as a working-basis, treating them as building stones towards a system which will stand in the same relation towards the natural disposition of the forms as the parts of a survey map are related to the configuration of the country which it represents.

The plant from which the plate was prepared was grown at Kew where it flowered for the first time in April of last year (1923). It had been received from Mr. E. J. P. Magor of Lamellen, St. Tudor, Cornwall, who had the seed (F. 1045) from Sir George Holford. It has proved quite hardy and promises to be one of the most ornamental species for rockwork. The fact that its home is on the rocks and moors of a granite mountain suggests, of course, the exclusion of lime in any appreciable quantity.

O.S.

Fig. 1, a whole plant, very slightly reduced; 2, a flowering branch, nat. size; 3, base (tube) of the corolla, $\times 4$; 4, part of a corolla, seen from without, $\times 2$; 5, a calyx and pistil, $\times 2$; 6, base and top of a stamen with anther, $\times 5$; 7, sessile and stipitate scales from a pedicel, $\times 40$; 8, scales from an ovary, $\times 40$.

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TAB. 9002.

BOYKINIA TELLIMOIDES.

Japan.

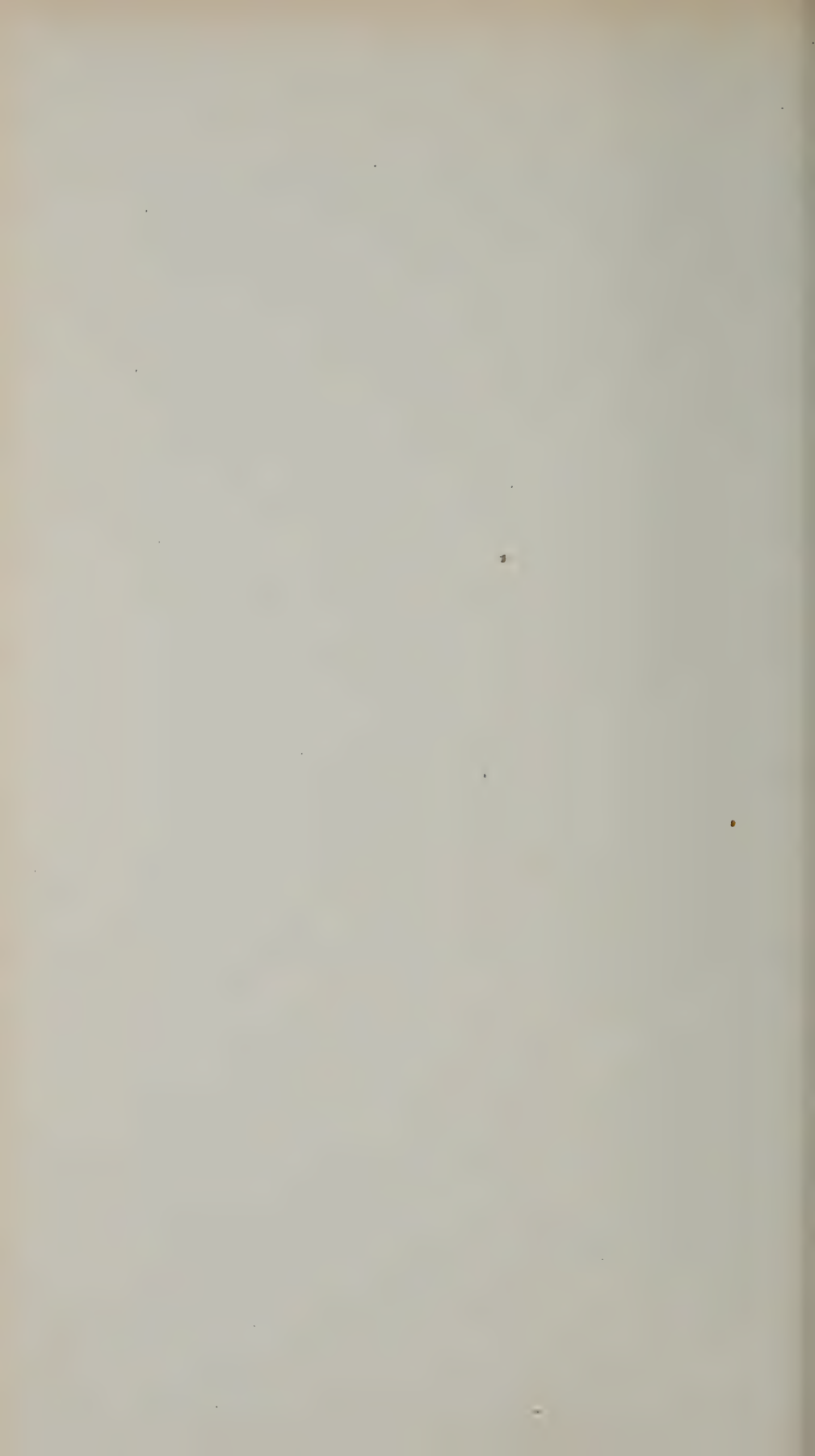
SAXIFRAGACEAE. Tribe SAXIFRAGAEAE.

BOYKINIA, Nutt.; *Benth. & Hook. f., Gen. Plant.* I. 636; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* III. 2a. 51. Therozon, *Raf., New Fl. Amer.* I. 66.

Boykinia tellimoides, *Engl. & Irmischer in Engl., Pflanzenreich*, IV. 117. 675 (1919); inter species generis foliis peltatis distinctissima.

Herba perennis, e rhizomate brevi crasso caespitosa, folia basalia et caules parce foliatis glabros 30—60 mm. altos erectos emittens. *Folia* basalia 2—3 cum quoque caule, longissime petiolata; lamina peltata, ambitu suborbicularis cum sinu angusto 2—3 cm. alto, 15—20 cm. diametro, profunde 7—9-lobata lobis late ovatis acutis intermedio circiter 4—5 cm. alto latoque caeteris basin versus decrescentibus omnibus grosse-serratis crenis mucronulatis, facie laete-viridis, dorso pallida, ad nervos primarios parce crispo-pubescens, caeterum glabra; petiolus ad 35 cm. longus, parcesime crispo-pilosulus; folia caulina 1—2 basilibus simillima, sed redacta, multo brevius vel (summum) brevissime petiolata, basi stipulata stipulis petiolo adnatis ovatis ad 3 mm. longis. *Flores* in racemum vel paniculam paucifloram angustam terminalem collecti; bracteae bracteolaeque minute lanceolatae vel lineares; pedicelli inferiores ad 8 mm. longi. *Receptaculum* late campanulato-turbinatum, 5—6 mm. longum, glabrum vel parce glanduloso-pilosulum. *Sepala* ovata, acuta vel acuminata, ad 5 mm. longa. *Petala* late oblonga, apicem versus grosse dentata, glanduloso-pilosula, ad 10 mm. longa, ad 5 mm. lata, viridi-flava. *Stamina* 10; filamenta 2—3 mm. longa, ima basi dilatata, in anulum angustum connata. *Antherae* basi cordatae, nigrae, 1 mm. longae; pollen albidum. *Ovarium* fere ad medium in receptaculo immersum, 2-loculare, obovoideum; styli 2, filiformes, 3 mm. longi; stigmata minute capitata. *Capsula* calyce persistente cineta, semisupera, aperta ob valvas divergentes bicornis. *Semina* atra, ellipsoideo-globosa, 0.6 mm. longa, dense muricata. *Saxifraga tellimoides*, Max. in *Bull. Acad. Pet.* XVI. 216 (1871); *Mel. Biol.* VIII. 6, 603, (1871); Iinuma, *Somoku Gusetsu*, ed. II., VIII. 18 (1874) et ed. III., ibidem (1910); Franch. et Sav., *Enum. Pl. Jap.*, I. 146 (1875) et II. 353 (1879); Mottet in *Rev. Hort.* 1908, 250, fig. 93; Matsumura, *Index Pl. Jap.* 190 (1912).

This is a perennial *herb* which from a short root-stock produces tufts of long-stalked leaves (generally 2 or 3 for each shoot) and sparingly leafy flowering stems. The basal leaves have a shield-shaped deeply 7- to 9-lobed bright green blade, almost orbicular in outline and measuring 15 to 20 cm. in diameter, with a narrow sinus on one side and with, on the back, prominent radiating ribs; its lobes are broadly ovate and coarsely serrate and they decrease in size towards the sinus; the 1 or 2 stem-leaves are similar to the basal, but much smaller



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A.- *Adiantum* L. A.W. Darnley 1888

B.- *Adiantum* L. A.W. Darnley 1888

H.F. & G. Witherby, London.

TAB. 9003A.

VERONICA CANESCENS.

New Zealand.

SCROPHULARIACEAE. Tribe DIGITALEAE.

VERONICA, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 964; *Wettst. in Engl. & Prantl, Nat. Pflanzenf.* IV. 3b. 85.

Veronica canescens, T. Kirk in *Trans. N.Z. Inst.* IX. 503, t. 19 (1877); inter species sectionis "*Calycinarum*" foliis parvulis rotundatis integerrimis insignis.

Herba pusilla, perennis, repens; caules tenues, hispiduli, radicantes, 2–10 cm. longi, intricati, mattas humillimas densas formantes. *Folia* opposita, subsessilia, rotundato-elliptica, obtusissima, 2–2·5 mm. longa, utrinque hispidula pilis albis retrorsis. *Flores* singuli in axillis foliorum; pedicelli tenues, ad 6 mm. longi, sub medio bi-bracteolati; bracteolae foliis similes nisi minus obtusae vel interdum subacutae. *Calyx* alte 4- vel 5-partitus, segmentis oblongis subobtusis hispidulis ciliolatis. *Corolla* caerulea, expansa 1 cm. diametro; tubus brevissimus; limbus 4-fidus, lobis inaequalibus, antico oblongo, caeteris elliptico-obovatis saepe minute emarginatis. *Stamina* 2; filamenta ad 4 mm. longa; antherae 0·6 mm. longae. *Ovarium* ambitu late ellipticum, paulo a latere compressum, glabrum; stylus 4 mm. longus. *Capsula* calyce persistente paulo aucto (ultra 3 mm. longo) cineta, late ovoidea, subretusa, leviter compressa, 2·5 mm. longa, tandem in valvas 4 soluta. *Semina* late obovoidea vel subglobosa, 0·6–0·7 mm. longa, minute punctata, hilo obscuro latiusculo. Kirk in *Trans. N.Z. Inst.* XXVIII. 516 (1896); Cheesem., *Man. New Zeal. Fl.* 547 (1906), non Bast. nec Presl. nec Schrad.

A loosely matted dwarf perennial *herb* with wiry thread-like minutely hairy stems which creep close to the ground and with roundish or broadly elliptic very blunt *leaves*, not more than 2 to 2·5 mm. long and minutely hairy on both sides. The *flowers* rise singly from the axils of leaves and are borne on delicate stalks about 6 mm. high and provided below the middle with a pair of bracteoles resembling the foliage-leaves. The *calyx* is deeply 4- (rarely 5-) cleft and about 2 mm. long; its segments are oblong and minutely hairy, particularly along the edges. The widely open *corolla* is deeply 4-cleft and up to 1 cm. in diameter; the front-lobe is oblong and narrower than the others which are elliptic-obovate; all the lobes are minutely notched at the tips and pale-blue with darker veins. The 2 *filaments* are 4 mm. long and they carry small yellow anthers. The slightly compressed *ovary* is elliptic in side-view. The mature *capsule* is surrounded

and exceeded by the persistent and slightly enlarged *calyx* and breaks up finally into 4 equal valves, exposing the more or less globose *seeds* which measure 0.6 to 0.7 mm in diameter.

DISTRIBUTION.—New Zealand : South Island ; Canterbury and Otago Divisions.

This is according to Kirk one of the smallest of the flowering plants of New Zealand. It inhabits usually the dried up margins of lakes and pools where it overruns the ground after the manner of *Anagallis tenella*, forming dainty mattings from which the relatively large sky-blue flowers, not unlike those of our Germander Speedwell, rise in profusion, carried singly on short erect stalks. The species is an extreme modification of a type of *Veronica*, represented in New Zealand by such species as *V. Bidwillii* and *V. Lyallii* (Bot. Mag. t. 6456). These also have prostrate stems and small almost leathery leaves, but they bear their flowers in long-stalked axillary racemes and the leaf-margins are more or less notched. *V. canescens* was first recorded by Kirk from Lake Lyndon, Canterbury Division, in the seventies of the last century. Since then it has repeatedly been found in the eastern portion of the South Island and in places, as in Central Otago, in great plenty. Owing to its smallness it is easily overlooked, except when in flower, when it is conspicuous enough.

The plant figured here has been grown in Edinburgh for a good number of years and it is now impossible to trace its source. Professor W. W. Smith, to whom we are obliged for the use of the original drawing, says that it enjoys a sunny situation in a well drained rather sandy soil and spreads its wiry stems fairly rapidly in summer. It dies back considerably during the winter months, but appears to be hardy.

O.S.

Fig. 1, part of a flowering plant, nat. size ; 2, a flowering branch, $\times 3$; 3, a corolla, $\times 3$; 4, a calyx with pistil, $\times 6$; 5, a fruit with calyx, $\times 6$; 6, a dehiscent fruit, $\times 6$; 7, seeds, $\times 25$.

TAB. 9003B.

CASSIOPE SELAGINOIDES.

(FORMA NANA.)

Himalaya and China.

ERICACEAE. Tribe ANDROMEDEAE.

CASSIOPE, D. Don; *Benth. & Hook. f., Gen. Plant.* II. 584; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 42.

Cassiope selaginoides, Hook. f. & Thoms. in Hook. *Kew Journ.* VII. 126, t. iv. (1855); affinis *C. fastigiatae*, D. Don, sed omnibus partibus gracilior, foliis haud superne hyalino-marginatis brevioribus, pedicellis pro rata longioribus (demum ad 15 mm. longis) distincta.

Fruicululus nanus, compacte caespitosus vel laxius diffusus, ramis e basi procumbente ascendentibus, 5—25 cm. altus; rami graciles, tenuiter puberuli, dense foliati. *Folia* quadrifariam imbricata, sessilia, lanceolata vel lanceolato-oblonga, basi breviter obtuse 2-loba, apice obtusiusculo setigera seta ad 0.75 mm. longa, dorso profunde sulcata et in sulca puberula et parce glandulosa, facie subconcaeva, ad margines tenuiter villosa-ciliolata villo demum evanido, 2—3 mm. longa, 0.7—1 mm. lata, atro-viridia. *Flores* solitarii, in pedicello gracili basi 3-bracteato pilis mollibus ramosis villosulo 5—15 mm. longo cernui; bracteae lanceolatae, acutae, submembranaceae, 2 mm. longae, ciliatae. *Sepala* ovato-lanceolata vel late lanceolata, acuta vel acuminata, 3 mm. longa, praeter marginem angustum album herbacea, glabra. *Corolla* lactea, ovoideo-globosa vel campanulato-globosa, 7—10 mm. longa, 5-lobata, lobis late ovatis 2—2.5 mm. longis. *Stamina* 10, circa stylum arete conniventia; filamenta 1—1.3 mm. (raro 1.5 mm.) longa, dorso magis minusve barbata vel fere glabra; antherae ellipsoideae, 0.5—0.7 mm. longae, basi subinaequales, aristis apicalibus angulo recto patentibus vel deflexis fere 0.6—0.8 mm. raro 1 mm. longis papillosis. *Ovarium* 5-lobum lobis dorso leviter sulcatis, paulo depressum, viride, 1 mm. altum; stylus 2.5 mm. longus. *Capsula* (e speciminibus exsiccatis spontaneis) sub-globosa, ad medium vel ultra 5-lobata lobis loculicidis, ad 3 mm. longa. *Semina* clavato-fusiformia, 0.5 longa, laevia, fusca. Clarke in Hook. f., *Fl. Brit. Ind.* III. 460 (1882); W. W. Smith in *Rec. Bot. Surv. Ind.* IV. 214 (1911); Diels in *Engl. Bot. Jahrb.* XXIX. 515 (1900); Wilson in *Sargent, Pl. Wilson.* i. 551 (1913) and in *Veg. West China*, t. 145.

C. selaginoides is a dwarf *shrublet*, growing in tufts or in sheets of sometimes considerable extent and rising from a few to 25 cm. The sessile dark evergreen *leaves* are arranged in 4 rows on the slender finely downy branches so as to overlap tightly; they are lanceolate or lanceolate-oblong in outline and slightly two-lobed at the base, ending with a short bristle from their blunt tips and measure from 2 to 3 mm. by 0.7 to 1 mm.; they are deeply channelled on the back and finely downy and glandular within the channel, whilst they are slightly concave and glabrous on the face; their frontal

edges are fringed with woolly hairs which disappear ultimately. The nodding white *flowers* are borne singly on very slender axillary stalks 5 to 1.5 mm. long. The *sepals* are more or less lanceolate, pointed and 3 mm. long; they are herbaceous but for the white margins and glabrous. The *corolla* is ovoid or globose-campanulate with 5 broad short lobes and it is 7 to 10 mm. long. The 10 *stamens* connive with their short bearded filaments over the small green ovary, the bristle-like tails of the small anthers standing off more or less at right angles to the *style* which is 2.5 mm. long. The *capsule* is globose, 2 mm. in diameter and it splits to or beyond the middle. The *seeds* are club- or spindle-shaped and about 0.5 mm. long.

DISTRIBUTION.—Sikkim and West China, from the Burma-Tibet-Yunnan frontier to Szechuan, between 3,300 and 4,600 m.

C. selaginoides was discovered by Sir Joseph Hooker in June, 1849, above Zemu Samdong in the Lachen Valley, Sikkim. It is one of the two dwarf heath-like andromedas mentioned in his Himalayan Journal (II., 46; ed. 1854). It grew there among many "very alpine" plants such as dwarf willows, *Pinguicula*, *Oxyria*, *Androsace*, *Saxifrages*, etc. The other "Andromeda" was *Cassiope fastigiata*. Professor W. W. Smith and Mr. Cave collected both in the same locality and up to and along the sides of the Zemu glacier, between 3,300 and 4,500 m. According to them *C. selaginoides* is much more scarce there than *C. fastigiata* (Rec. Bot. Surv. Ind. IV. 214; 1911). C. B. Clarke also quotes it from Jongri on the southern flank of Kinchinjunga. A much larger area of *C. selaginoides* extends from the Salween-Mekong watershed on the Burmese-Chinese frontier through north-western Yunnan into Szechuan as far as Tachienlu and Mt. Omei with an altitudinal range from 3,600 to over 4,600 m. *C. selaginoides* grows there either on stony dry slopes and cliffs or in open moorland or as undergrowth in rhododendron thickets. A photograph by E. Wilson (Veg. West China, No. 145) gives an excellent view of the latter condition. Future collections will no doubt bridge the great gap between the two areas. The

Chinese specimens are on the whole more robust and taller than those from Sikkim, but structurally they are practically identical. The plant figured here marks on the other hand a state of excessive dwarfing, such as may be found among Hooker's specimens. It was grown at Kew as a pot-plant from seed received from the Darjeeling Garden in 1920 and it flowered first in the spring of 1923. It has since been planted out in the open ground, but it has hardly increased in height, although apparently quite healthy. It is no doubt perfectly hardy and will probably thrive best in peaty soil on rock-work where in spite of its dwarf stature it ought to be very effective.

The very remarkable structure of the leaves of *C. selaginoides* has been fully dealt with by F. Niedenzu in a paper on the anatomy of the leaves of the Arbutioideae and the Vaccinioideae (in Engl. Bot. Jahrb. XI.). The dorsal channelling of the leaves is explained there as being brought about by the rolling back of the margins of the blade until they almost meet so that the whole of the dorsal surface becomes enclosed in the channel, the outer convex sides corresponding to the revolute portions of the upper-surface of the blade. But the transitions from dorsally flat to dorsally channelled blades which may be seen on underground shoots leave no doubt that the anticlinal edges are the true margins whilst the channel is a groove in the back. This leaf-structure is repeated in *C. fastigiata*, a plant widely distributed through the alpine Himalaya, and in its Chinese representative, *C. pectinata*,* as also in the well-known arctic *C. tetragona*, whilst in *C. Redowskii* (East Siberia) the channel is closed except at the base so that the leaf becomes tubular. In each case the stomata are confined to the inner faces

* *C. pectinata*, Stapf (*sp. nov.*); *C. fastigiata*, D. Don, habitu simillima, sed foliorum marginibus superne haud membrana hyalina cinctis et ad latera setis rigidis pubescentibus quasi pectinatis necnon pedicellis ad 2.5 cm. longis distincta. This species which resembles very much *C. fastigiata* may be recognised by the margins of its leaves which are not bordered towards the tips by a hyaline membrane and bear on the sides stiff bristles more or less fluffy when young. The pedicels also grow out to a much greater length (2.5 cm.).

DISTRIBUTION.—Tibet-Yunnan frontier: Salween-Kiuchiang divide (28° 40' N.L.—98° 15' E.L.), Forrest, 19068; Mekong-Salween and Mekong-Yangtse divides (28° 12'—28° 30' N.L.), 3600–4800 m., Ward, 438, 582; Forrest, 489, 13,944, 14,158. North-west Yunnan, to the north-east of the Yangtse bend (27° 45' N.L.), Forrest, 10,440.

of the channel (or tube) which are moreover lined with short club-shaped glands and in some cases small hairs. The physiological function assigned to the channels of these "roll-leaves," as they have been called, a type by no means uncommon in Ericaceae and in other plants of an "ericoid" habit, is that of protection of the stomata from wetting (Kerner) or, by the formation of a "windstill" space, from excessive transpiration (Warming). They act probably either way and thus enable the plant to resist great changes towards one or the other extreme.

With the discovery of two more species of *Cassiope* in the high mountains of the Burma-Tibet-Yunnan frontier (*C. palpebrata*, W. W. Smith, with small flat spreading leaves recalling those of *Harrimanella Stelleriana*, Cov., and *C. myosuroides*, W. W. Smith, with appressed leaves, coriaceous in the lower spoon-shaped half and delicately hyaline in the triangular pointed upper half) the centre of the genus has shifted from the arctic and subarctic zone to the Sino-Himalayan highlands which assume in our eyes more and more the character of a gigantic reserve in which Nature has not only preserved a flora elsewhere pitilessly battered and scattered by the ravages of the glacial period, but has also increased a bounteous heritage on lines of extraordinary liberality and freedom from the limitations generally imposed by the struggle for life. O.S.

Fig. 1, a whole plant, nat. size; 2, a barren branch, $\times 5$; 3, a leaf in back-view, $\times 15$; 4, the same in half front-view, $\times 15$; 5, a flowering branch, $\times 3$; 6, a corolla in top-view, $\times 3$; 7, a stamen, $\times 20$; 8, a pistil, $\times 10$; 9, ovary in cross-section, $\times 14$.

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TAB. 9004.

MAGNOLIA WILSONII.

China.

MAGNOLIACEAE. Tribe MAGNOLIEAE.

MAGNOLIA, Linn.; Benth. & Hook. f., Gen. Plant. I. 18; Prantl in Engl. & Prantl, Nat. Pflanzenf. III. 2. 16.

Magnolia Wilsonii, Rehd. in Sargent, Pl. Wilson. I. 395 (1913); cum *M. Nicholsoniana*, Rehd. & Wils. et *M. sinensi*, Stapf (Syn. *M. globosa* var. *sinensis*, Rehd. & Wils.) comparanda, ab illa foliis subtus molliter tomentosis, tepalis 9 latioribus (saltem interioribus), ab hac foliis minoribus multo angustioribus (haud obovatis) apice nec rotundatis nec breviter acuminatis et floribus minoribus distincta.

Frutex divaricatus, 3 m. altus vel arbuscula ad 8 m. alta; rami graciles, hornotini rufo-villosi, annotini glabri, cortice purpureo-brunnei, parce lenticellosi. *Gemmae* terminales anguste oblongae, 1.5–2 cm. longae, dense rufo-villosae. *Folia* decidua; lamina ovato-oblonga e basi rotundata, a medio vel a triente summo in apicem acuminatum attenuata, ad 15 cm. longa, ad 6 cm. lata, plerumque vero minor, supra glabra, clare viridis, subtus pallidior et molliter tomentosa, pilis albidis nisi in costa flavescens, nervis lateralibus utrinque 10–12 uti costa dorso prominentibus; petiolus 1.5–3 cm. longus, rufo-tomentosus; stipulae alte adnatae, parte libera lanceolata acuta ad 1.5 cm. longa, dense fulvo-rufo-tomentosae. *Flores* cum foliis coëtanei, solitarii, nutantes, primo globoso-cupulares, deinde late aperti, albi, fragrantés, 9–10 cm. diametro; alabastra ovoidea, acuta, spatha superne fulvo-pilosa; pedicellus 2.5–3 cm. longus, medio bracteam spathoideam fulvo-villosam ex apice saepe foliaceam cito deciduam cicatricem annularem desinentem gerens, infra eam villosus, supra parce pilosus vel glabratus. *Tepala* 9; extima 3 oblonga, subacuta, 4–5 cm. longa, 2.5 cm. lata, intermedia 3 basi subcarinata et extra interdum leviter flavescens, late obovato-elliptica, 5–6 cm. longa, 3.5–4 cm. lata, apice late rotundata et submarginata; intima 3 oblongo-elliptica, basi attenuata, 3.5 cm. longa, 2.5 cm. lata, rotundata. *Stamina* circiter 60, kermesino-purpurea, cum filamento brevi 11 mm. longa. *Gynoecium* primo albidum, deinde flavescens vel viridescens, 2.5 cm. longum, carpellis circiter 25, stylis recurvis. *Fructus* ambitu oblongus, basi paulo attenuatus, 6–10 cm. longus, 2–3 cm. diametro, ante dehiscens rubens; folliculi arete congesti, rostrati, 1.5–2 cm. longi, aperti ad 1.2 cm. lati, extra purpureo-fusci, intra pallide lutescentes vel fusciscentes. *Semina* plerumque 2-na, obovoideo-globosa, duobus faciebus applanata, 6–8 mm. lata, scarlatina vel demum griseo-brunnea, esulcata. *M. parviflora* var. *Wilsonii*, Finet & Gagnep. in Bull. Soc. Bot. France, lii. Mem. IV. 39 (1905) et Contrib. Fl. As. Or. II. 39 (1907). *M. globosa*, Wilson in Gard. Chron. XXXIX. 234 (1906), non Hook. f. & Thoms.

A deciduous *shrub* or small *tree* with purplish-brown branches (last season's) and thin papery *leaves* which are ovate-oblong, tapering from or from above the middle to an acute point and measuring up to 15 cm. by 6 cm., and which, on the underside, are covered with a rather long soft whitish down. The nodding *flowers* have at

first the shape of an almost globose cup, but they expand afterwards and become saucer-like with up-turned tips and measure 9 to 10 cm. in diameter; they are composed of 9 very blunt and concave pure-white *tepals* (undifferentiated sepals and petals) in whorls of three with the crimson *stamens* (about 60) and the whitish or yellowish cone of *pistils* in the centre. The nodding *fruit* is oblong, measuring 6 to 10 cm. by 2 to 3 cm. and salmon-coloured to brownish-pink before the crowded rhombic-oblong follicles dehisce; these are beaked and 1.5 to 2 cm. long and contain usually 2 scarlet rounded *seeds* which are for some time suspended on whitish threads formed by the unrolled spiral vessels of the rhaphe.

DISTRIBUTION.—Szechuan, in woods and thickets to the south-east of Tachienlu, from 2,000 to 2,800 m.

This is one of a group of species, ranging from the Himalaya to Japan and characterized by deciduous leaves and slender-stalked white flowers with a crimson ring of stamens in the centre, which appear with or after the foliage. Their specific differences are mainly in the shape and size of the leaves and flowers and the degree of hairiness. Considering their great general resemblance it is not surprising that our plant was originally confused with the Himalayan *M. globosa* and the Japanese *M. parviflora* of which it was thought to be a variety. From both it differs sufficiently in the larger stipules, the differently shaped leaves and the bracteate flower-stalks and from the latter species particularly in the felted backs of the leaves. The relationship of *M. Wilsonii* is much closer indeed with *M. Nicholsoniana* and *M. sinensis*, both natives of Szechuan within a radius of 100 kilometers from its home. For the characters by which it may be distinguished from them we may refer to the differential diagnosis given above.

M. Wilsonii was discovered by the explorer and collector, whose name it bears, in the woods and thickets around Tachienlu in 1904 (No. 3137, Veitch Exp.) and it was collected again by him in the same locality four years later (No. 1374, Arn. Arb. Exped.). It flowers there at the end of May and in June, that is about the same time as in this country, whilst curiously enough the

fruiting seems to be delayed in its native habitat (October, instead of the end of August and September, as at Kew and Glasnevin). *M. Wilsonii* is a conspicuous object in the woods of Tachienlu as it flowers freely; and as it seems to require only little shelter in most parts of this country, it deserves the appreciation of the gardener which Wilson has claimed for it.

For the material from which the plate was drawn we are indebted to Mr. J. W. Besant, the Acting Curator of the Glasnevin Botanic Gardens. It originated, he informs us, from seed received from the Arnold Arboretum in 1909 (Wilson, No. 1374). He further writes: "It is grown against a wall with a northern aspect. It is making vigorous growth and numerous layers have been taken off it. It appears to like a fairly stiff retentive soil. Small plants have been put out in the open and I am in hopes that they will eventually form good specimens. It is certainly one of the most beautiful members of the genus in our collection."

Specimens of an earlier introduction (Veitch, No. 528) are grown at Kew where they flowered first in 1920. They are noteworthy on account of their sparser and more evanescent hairiness and their smaller less tapering leaves. In this they agree with samples received from Mr. H. W. Grigg, Cann House, Crown Hill, S. Devon, in 1917. Both the Kew and the Crown Hill plant incline in that respect towards *M. Nicholsoniana*, but without merging into it. O.S.

Fig. 1, a flowering branch; 2, a pair of stipules; 3, a longitudinal section through the androecium and gynoecium; 4 and 5, stamens in front- and side-view; 6, gynoecium or cone of pistils; 7, a fruit placed upright, beginning to dehisce; 8, the same with the follicles fully dehiscent. All natural size, except Figs. 4 and 5, which are $\times 2$.

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TAB. 9005.

PENTAS COCCINEA.

Tropical Africa.

RUBIACEAE. Tribe HEDYOTIDEAE.

PENTAS, Benth.; Benth. & Hook. f., Gen. Plant. II. 54; K. Schum. in Engl. & Prantl, Nat. Pflanzenf. IV. 4. 29.

Pentas coccinea, Stapf (sp. nov.); affinis *P. zanzibaricae*, Vatke, foliis latioribus, corollis maioribus splendide coccineis, limbi segmentis linearibus in statu macrostylo 8 mm. longis 2.5 mm. latis distincta.

Suffrutex ad 5 dm. altus, laxè divaricatus, ramis vetustis lignosis cortice griseo tectis, junioribus viridibus teretibus breviter hirsutis. *Folia* petiolata, ubique molliter pubescentia; lamina ovato-oblonga, basi longe attenuata et in petiolum decurrens, apice acuta, 7—15 cm. longa, 2.5—5.5 cm. lata, herbacea, facie viridis, dorso pallidior, pilis in dorso ad costam nervosque patulis, hisce utrinque 7—9 obliquis conspicuis; petiolus 1—5 cm. longus; stipulae in fimbrias 3—5 subulatas vel filiformes apice glanduloso-incrassatas ad 4 mm. longas solutae. *Inflorescentia* valde contracta, corymbiformis, pubescens, circiter 7 cm. diametro; rami 4, subumbellati, secunde spicati, floribus geminatis, anthesi peracta ad 2.5 cm. elongati, florum paribus 3—6 mm. distantibus. *Flores* dimorphi, alii microstyli, alii macrostyli, splendide coccinei. *Receptaculum* obovoideum, 2 mm. longum, pilosulum. *Sepala* inaequalia, 2 foliacea, linearia, 8—10 mm. longa, ad 3 mm. lata, pilosula, caetera 3 subulata, 2—3 mm. longa. *Flos microstylus*: *Corollae* tubus gracilis, superne haud ampliatus, 9—10 mm. longus, extra pilosulus, intra ostium versus breviter pilosus pilis vix exsertis; limbus circiter 8 mm. diametro, segmentis linearibus cum apiculo minuto arcu inflexo 1.5—2 mm. latis. *Stamina* sub ore inserta, filamentis tenuissimis ad 4—5 mm. exsertis, antheris medio affixis linearibus 4 mm. longis. *Stylus* cum stigmatibus 2 mm. longis filiformibus in corollae tubo inclusus, ostium eius vix attingens. *Flos macrostylus*: *Corollae* tubus in triente supero modice ampliatus, 12—14 mm. longus, hic extra parce pilosulus, intra infra medium laxè pilosus, de staminum insertionem sursum dense hirsutus, ostio pilis faretis; limbus ad 18 mm. diametro, segmentis 2.5 mm. latis. *Stamina* in tubo ampliato tota inclusa, antheris subsessilibus 2—2.5 mm. longis. *Stylus* longe exsertus, stigmatibus rubris 3 mm. longis. *Capsula* hemisphaericoturbinata, 4 mm. longa, sepalis persistentibus coronata, vertice valvis 2 aperta. *Semina* numerosa, angulata, 0.5 mm. longa. *P. Klotzschii*, Vatke in Oest. Bot. Zeitschr. XXV. 232 (1875) quoad plantam Hidebrandtianam citatam nec quoad synonyma, ideoque nomen nudum. *P. carnea*, Hiern in Oliv., Fl. Trop. Afr. III. 46 (1877) pro parte; Oliv. in H. H. Johnston, Kilimanjaro Exped. 340 (1886), non Benth.; *P. carnea* var. *Klotzschii*, Scott Elliot in Journ. Linn. Soc. XXXII. 434 (1896); *P. lanceolata*, K. Schum. in Engl. & Prantl, Nat. Pflanzenf. IV. 4. 29 (1891) quod plantam Africae Orientalis; Werth, Veget. Ins. Sansibar, 42 (1901), non Defflers.

This is an *undershrub* about 5 dm. high and softly and shortly hairy in all the green parts. The ovate or ovate-oblong *leaf-blades* are slightly greyish-green and they are borne on stalks 1 to 5 cm. long along which they continue more or less as narrow wings; they measure

7 to 15 cm. by 2.5 to 5.5 cm. and are traversed on each side of the midrib by 7 to 9 oblique conspicuous nerves; the stipules are divided almost to the base into 3 to 5 awl-shaped or thread-like segments with thickened gland-like tips. The brilliantly crimson *flowers* are grouped in much contracted almost umbel-like corymbs, about 7 cm. in diameter. The *sepals* are very unequal, two being leafy, linear and up to 10 mm. long whilst the other three are quite short and awl-shaped. There are two types of individuals, namely, those with small *corollas* (tube 9 to 10 mm. long, limb 8 mm. across), long exserted *anthers* and enclosed *styles* and stigmas, and others with larger corollas (tube 12 to 14 mm. long, limb 18 mm. across), enclosed stamens and long exserted styles and stigmas; the tube of the short-styled state is slender and cylindric throughout, that of the long-styled state is widened in the upper third which contains the stamens; the segments of the limb are linear in either case and spread at right angles. The *capsules* are shortly top-shaped, about 4 mm. long and crowned by the dry persistent calyx and they open with two terminal valves.

DISTRIBUTION.—East African coast and its Hinterland from the Tanga river to Usambara; also in the Island of Zanzibar.

This plant is a common element of the dry littoral of the East African coast from the Tana to the Pangani, and during the dry season it is an ornament of the grass-land owing to its brilliant crimson flowers. It also extends inland as far as Kikuyu and the steppes at the foot of Kilimanjaro. In Usambara it appears to be a common constituent of the bracken-formation of the montane bush. It has repeatedly been collected, but was confused either with Forskål's *Ophiorrhiza lanceolata*, a plant of Yemen on which rests the combination *P. lanceolata*, proposed by Deflers* in 1889, or with *P. carnea*, an East African species, which was introduced to cultivation almost simultaneously in India (Calcutta) and Europe (Paris) over eighty years ago. *P. lanceolata*, of which there is a

* Deflers, Voy. Yemen, 142.

specimen collected by Forskål in the Herbarium of the British Museum, has narrow lanceolate leaves and corollas whose lobes are white on the face and violet on the back, whilst *P. carnea* may easily be recognised by its flesh-coloured corollas and their relatively broad and short almost ovate lobes.

The plant portrayed here was raised at Kew from seed recently received from Amani with the designation "*P. coccinea*." I have not been able to trace this name in literature or elsewhere, but it seems so appropriate that it may stand. At Kew the plant has so far been treated as a stove plant and kept rather moist; as it is, however, by its habitat xerophilous, a warm greenhouse (Cape-house) would probably be more suitable.

Like other species of *Pentas*, *P. coccinea* has distinctly dimorphic flowers, the individuals with long-styled flowers being by far more showy than those whose anthers are exserted. The former are, of course, more valuable horticulturally, but to ensure seeding it may be necessary to grow both forms side by side or fertilize the flowers artificially. So far the Kew plant which is long-styled has proved self-sterile.

The genus *Pentas* is widely distributed through Tropical Africa and particularly East Africa whence it extends south as far as Zululand. One species is found in Tropical Arabia and a few more are recorded from the Comoro Islands and Madagascar. It is not easy to estimate the number of species known, as the dimorphism of the flowers and their frequently bad preservation—they seem to fade and shrivel quickly if not laid in at once and are moreover apt to lose their colour—render the task of discrimination difficult. Not a few of them are showy plants with white flowers from 9 to 12 cm. in length, a few are climbers or twiners with clusters of crimson flowers, others have purple or blue-violet corollas. It should not be difficult to secure some of these for our glass-houses.

O.S.

Fig. 1, a flowering branch, long-styled form, nat. size; 2, a pair of leaf-bases with stipules, $\times 6$; 3, a flower, $\times 3.5$; 4, a corolla-tube in longitudinal section, $\times 6$; 5, a longitudinal section through the receptacle and the ovary, $\times 6$; 6, anthers in front- and back-view, $\times 12$; 7, the upper part of a style and its stigmas, $\times 12$.

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TAB. 9006.

LYSIONOTUS PAUCIFLORUS.

Japan. China.

CYRTANDRACEAE. Tribe AESCHYNANTHEAE.

LYSIONOTUS, D. Don; *Benth. & Hook. f., Gen. Pl. II.* 1015; *Fritsch in Engl. & Prantl, Nat. Pflanzenf. IV.* 3b. 154.

Lysionotus pauciflorus, Maxim. in *Bull. Acad. Petersb.* XIX. 534 (1874) et *Mel. Biol.* IX. 366 (1874); affinis *L. brachycarpo*, Rehder, sed foliis grosse crenatis magis oblongis brevius petiolatis, floribus maioribus, calycis dentibus minoribus (3—4 mm. longis), corolla basi magis attenuata distinctus.

Suffrutex rupicola vel epiphyticus, e rhizomate elongato repente caules ascendentes ad 25 cm. altos emittens, praeter novellas interdum puberulas glaberrimus, cortice iuniore purpurascente vetusto cinerascente. *Folia* breviter petiolata, ternatim verticillata vel subverticillata verticillis superioribus approximatis; lamina cuneato-linearis vel cuneato-oblonga vel oblonga, 2—5 (rarius 7) cm. longa, 2—12 mm. lata, carnosio-coriacea, utrinque grosse 2—5-dentata dentibus saepe versus apicem sitis apice ipso acuto vel truncato, supra saturate viridis, interdum glaucescens, dorso subalbida, costa crassiuscula et saepe purpurascente percursa, nervis obscuris; petiulus purpureus, 2 vel 3 mm. longus. *Cymae* 1- ad 3-florae ex axillis summis paucae vel ad 10; pedunculi breves vel ad 3 cm. longi, graciles; bractee lineari-oblongae, 2 mm. longae. *Calyx* 5-partitus, laciniis anguste lanceolatis acutis 3—4 mm. longis. *Corolla* tubulosa, 3—4 cm. longa, pendula; tubus a basi per 10—13 mm. angustatus, deinde ampliatus, superne 12—14 mm. diametro, extra albidus, purpureo-suffusus et striatus intra striis 9 violaceo-purpureis in faucibus distinctissimis necnon antice plicis duobus elevatis luteis notatus; limbus brevis, bilabiatus, labio superiore bilobo albido, inferiore trilobo flavescente lobis omnibus latissimis. *Stamina* antica 2 fertilia, filamentis inferne spiraliter tortis longiusculis, antheris rotundatis apice contiguis; stamina posteriora 2 sterilia, ad filamenta filiformia apice paulo incrassata reducta; staminodium posticum minutum. *Discus* breviter cylindricus, crassiusculus, denticulatus. *Ovarium* fusiforme, 1.5 cm. longum, in stylum 1 cm. longum stigmate minuto discoideo coronatum abiens. *Capsula* fusiformis, 4—9 cm. longa, subrecta. *Semina* fusiformi-cylindrica, 1 mm. longa, e funiculo capillari fere 3 mm. longo pendula, apice setam 2—3 mm. longam gerentia. Franch. et Sav. *Enum. Pl. Jap. I.* 327 (1875); S. Moore in *Journ. Bot.* XIII. 231 (1875); C. B. Clarke in *Cas. DC. Mon. Phan.* V. 599 (1883); Makino, *Illustr. Fl. Japan I. t. II.* (1888) and *I. 3, t. II.* (ed. II., 1891); Hemsley in *Jour. Linn. Soc.* XXVI. 225 (1890). *Lysionotus pauciflorus* var. (?), Henry in *Trans. As. Soc. Japan* XXIV. Suppl. 68 (1896); Matsumura and Hayata in *Journ. Coll. Sci. Tokyo* XXII. 288; *Enum. Pl. Formos.* 287 (1906). *Lysionotus warleyensis*, Willmott in *Gard. Chron.* LIV. 125 (1913). *Lysionotus Willmottiae* Hort. in *Gard. Chron.* LVI. 17, 100.

This is a glabrous *under-shrub*, growing on rocks or trees with a long creeping rhizome and with stems ascending to about 25 cm. The shortly stalked *leaves* are usually placed in whorls of 3, the upper of which are more or less crowded; the blades are oblong or slightly wedge-shaped, coarsely toothed upwards, with the

terminal tooth pointed or truncate, softly coriaceous, dark green on the face and almost whitish on the back and they measure 2-5 cm. by 2-12 mm. The *flowers* are carried in 1- to 3-flowered cymes on slender, bracteate peduncles up to 3 cm. long, the special flower-stalks measuring about 1 cm. The *calyx* is deeply 5-cleft with narrow lanceolate acute segments 3-4 mm. long. The pendulous tubular *corolla* is 3-4 cm. long, the tube widening from 1-1.3 cm. above the base and passing after a slight constriction into the oblique two-lipped very broadly and shortly lobed limb; the whole corolla is white, variously suffused with violet or purple and marked with violet longitudinal streaks which are particularly dark in the throat where they contrast at the same time with two yellow ridges (folds). Of the five *stamens* two only (the front ones) are perfectly developed with more or less spiral filaments and round anthers which connive over the stigma; of the others, the hindmost is reduced to a minute staminode and the posterior two to threadlike curved filaments. The *capsule* is slender, spindle-shaped and 4-9 cm. long and it contains a great number of small cylindric seeds (1 mm. long) borne on a hairlike funicle and passing at the other end into a fine hair or bristle 2-3 cm. long.

DISTRIBUTION.—South China and Yangtse basin, Formosa, and the Southern Islands of Japan (Shikoku and Kiusiu).

Lysionotus pauciflorus became first known from the island of Kiusiu where in 1863 Maximowicz discovered it growing on trees in the virgin forests of Mt. Naga. This and the province of Tosa in the neighbouring island of Shikoku mark the northern limit of the area of the species which otherwise ranges widely throughout the basin of the Yangtse as far as Mt. Omei and southwards through Chekiang and Fokien to Yunnan. It has also been collected in the mountains of Formosa by A. Henry and more recently by Japanese collectors and Mr. W. R. Price. It reaches its upper limit at 1,300 m. in Szechuan and at 2,100 m. in Yunnan (Mengtse). It is not hardy in this country, but may be grown in an ordinary greenhouse in pans or suspended in baskets. The late Mr.

Elwes to whom we are indebted for the specimen figured here grew it in his "Alpine House" in a pan of sandy loam with just enough protection to keep it free from frost. It flowered there profusely during the summer. Mr Elwes had the plant from Miss Willmott of Warley House, Great Warley, Essex, who exhibited it first at one of the Royal Horticultural Society's shows in 1913. It was introduced into cultivation from seed collected for the Arnold Arboretum by Mr. E. H. Wilson (No. 370) on limestone cliffs above Hsing shan Hsien at 1,200-1,500 m. on the southern slopes of the Ta pa shan, N.W. of Ichang in 1907.

Lysionotus, represented in Clarke's monograph of the *Cyrtandraceae* by three species, two Indian and one Chino-Japanese, has since been shown to include over a dozen species, all the additions, but one (*L. pubescens*; Muny-pore), originating from South-western China, which appears thus as the evolutionary centre of the genus with the Indian area as a secondary extension. Morphologically, *Lysionotus* is well marked off from the other genera of *Aeschynanthae* and is at the same time fairly homogeneous in itself. *Loxostigma* which is generally placed next to it and whose area coincides approximately with the South Chinese and the Indian sections of the area of *Lysionotus* differs clearly from it by having four perfect stamens and yellow corollas. O.S.

Fig. 1, a flowering stem ; 2, lower half of a corolla, seen from within ; 3, upper half of the same ; 4, fertile stamens, $\times 6$; 5, pistil and calyx, $\times 2$; 6, disc surrounding the base of the ovary, $\times 5$. Figs. 1 to 3, nat. size.

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TAB. 9007,

SPENCERA RAMALANA.

China.

ROSACEAE. Tribe SANGUISORBEAE.

SPENCERA, *Trimen*; *Focke in Engler & Prantl, Nat. Pflanzenf. III. 3. 43.*

Spencera* *ramalana*, *Trimen in Journ. Bot. XVII. 97 (1879).* Species unica hucusque descripta.

Herba perennis, ad 25 cm. alta, undique laxè longiuscule hirsuta vel sericeo-villosa, e rhizomate pluricipite foliorum vetustorum vestigiis brunneo-fuscis dense squamato caespitosa; rhizomatis rami foliorum fasciculum densum et cum fertiles caulem erectum vel ascendentem imperfecte foliatum emittentes. *Caules* floriferi in planta spontanea fere semper simplices, in culta interdum ramosi, teretes. *Folia perfecta* basalia, impari-pinnata, basi breviter vel ad 3 cm. vaginantia vaginis demum induratis, rhachi gracili 2.5—12 cm. longa; foliola plerumque 6. (rarius 4. vel 5.) iuga, lateralibus subsessilibus, late elliptica e basi rotundata, apice grosse 2- (raro 3-) dentata, superiora 10—15 mm. longa, 5—10 mm. lata, infima multo minora, omnia crassiuscula, viridia vel interdum ob hirsutiem copiosam argenteo-sericea, tenuiter nervosa; foliolum terminale lateralibus simile nisi paulo maius et semper 3-dentatum. *Folia caulina* pauci- vel 1-iuga vel 3-secta vel summa 3- vel 2-dentata, sursum in bracteas abeuntia, stipulis herbaceis usque ad foliolorum vel segmentorum ortum rhachi adnatis praedita; foliola vel segmenta vel stipulorum partes liberae angusta, acutissima. *Inflorescentia* laxè racemosa, rarius subpaniculata, 5—20 cm. longa; bracteae ambitu oblanceolatae, rarius latiores, 3-fidae vel 3-lobae vel superiores integrae, anguste lanceolatae et acutae, 2—0.8 cm. longae; pedicelli stricti, 4—1.5 cm. longi; bracteolae 2-nae, oppositae, alte in cupulam flori arcte approximata raro pauca mm. distantem connatae, argute grosse 4—5-dentatae, dente intermedio 3—4 mm. longo, lateralibus commissuram versus decrescentibus hirsutis et insuper uti tota cupula glanduloso-pubescentibus. *Receptaculum* obconicum, vix 2 mm. longum, extra dense albo-sericeum, intra glaberrimum, vertice disco late annuliformi et centro in tubum brevem producto clausum. *Sepala* lanceolata, subulato-acuta, 7—8 mm. longa, hirsuta et glanduloso-pubescentia, extra ad sinus lobis stipulaceis late rotundatis 1.5—2 mm. longis hirsuto-ciliatis additis. *Petala* aurea vel crocea, obovata, basi in unguem contracta, 10—12 mm. longa, ad 7 vel 8 mm. lata, patentia. *Stamina* 35—40; filamenta ad 6 mm. longa, persistentia; antherae rotundatae, vix 1 mm. diametro. *Carpella* 2, in receptaculo inclusa, ovato-oblonga, facie plana, dorso convexa, apice longe hirsuta pilis ex tubo disci penicilli instar exsertis; stylus filiformis, circiter 6 mm. longus; stigma punctiforme; ovula solitaria, ex loculi angulo interiore pendula. *Fructus spurius* e flore praeter petala decidua paulo mutato nisi siccò et subindurato constitutus, totus deciduus. *Achenium* 1 perfectum, subglobosum, comatum, 3.5 mm. longum, pericarpio tenui fusco-brunneo. *Semen* achenio conforme, exalbuminosum, testa tenuissima. *Cotyledones* subquadratae, crassae, intra concavae; plumula et radícula brevissimae. *Forbes & Hemsley in Journ. Linn. Soc. XXIII. 246 (1887); Franchet, Pl. Delav. 216, t. 45 (1889).*

* *Trimen* wrote *Spenceria*. I prefer the form *Spencera*, following the usual practice in latinising names derived from proper names ending in *er* and the recommendations of the International Code.

A perennial *herb* whose shortly and closely branched rhizomes produce tufts of leaves and erect or ascending, mostly simple flowering stems, all parts of the plant having a loose and spreading, or sometimes dense and silvery hairy covering. The *basal leaves* are pinnate with mostly 6 pairs of broadly elliptic and coarsely 2-toothed leaflets, the upper and larger of which measure 10 to 15 mm. by 5 to 10 mm.; the terminal leaflet is slightly larger and 3-toothed. The *stem-leaves* are reduced to 2 or 1 pair of leaflets with a pair of stipules adnate to the spindle or they are 3-cleft or 3- to 2-toothed and they pass into similar or entire and lanceolate bracts; all these leaflets or leaf-segments or stipules are narrow and very acute. The *flowers* are grouped in somewhat stiff loose racemes, 5 to 20 cm. long and borne on straight pedicels, the lower of which may be up to 4 cm. long; each flower is supported by and partly enclosed in a coarsely toothed cup-like involucre formed of 2 bractlets which are, like the pedicel and the calyx glandular and coarsely hairy. The small *receptacle* is top-shaped, silvery-tomentose and enclosed in the involucre; it bears on the inner rim a ring-shaped disc which projects towards the centre where it is produced into a short tube. The *sepals* are lanceolate, very acute and 7 to 8 mm. long. The golden- or reddish-yellow *petals* are obovate and shortly clawed and measure 10 to 12 mm. by 7 to 8 mm. There are 35 to 40 *stamens* with persistent filiform filaments up to 6 mm. long and small round anthers. The 2 *carpels* are completely enclosed in the receptacle, their simple filiform styles protruding through the disc-tube along with a tuft of silvery hairs from the upper part of the carpels. At maturity the whole of the slightly enlarged, dried up and rigid flower (with the exception of the petals which fall early) separates very tardily from the flower-stalks inside the involucre as a "*false fruit*," containing a single perfect achene, enclosed in the slightly enlarged, but otherwise hardly changed receptacle. The *achene* is almost globose with a thin pale-brown membranous shell and a tuft of hairs on the top and it measures about 3.5 mm. in length. The *seed* has a very delicate seed-coat whilst the *embryo* consists of 2 large almost square convex-concave cotyledons with a short radicle and minute plumule.

DISTRIBUTION.—Szechuan; on the high mountains near Tachienlu and westwards to the Tibetan frontier, from 3,000 to 5,000 m. Yunnan; in the mountains north of Tali at 3,000 m.

This freely flowering and very decorative plant inhabits the dry highland-pastures of western Szechuan and north-western Yunnan up to a very considerable altitude. It became first known from a few inflorescences which Capt. W. J. Gill, R.E., the well-known explorer, had brought home from his journey in western China in 1877. They were collected on Ra ma la, between Tachien-lu and Litang at an altitude of nearly 4,500 m. Although the specimens were so incomplete, the structure of the flowers was sufficient to allow Mr. H. Trimen to recognize in them the type of a new genus which he named after his friend Mr. Spencer le Marchant Moore, then an assistant in the Kew Herbarium. Seven years later the Abbé Delavay found the plant on the limestone mountain Hee-chan-men, north of the lake of Tali, at 3,000 m., and it was his material from which Franchet gave for the first time a complete description and illustration, except for the ripe fruit which remained unknown until now. Since then *Spencera ramalana* has frequently been collected within the area described above, e.g. by Pratt (588, 701), Soulié (658, 894), Wilson (3452), Forrest (2734).

Trimen has already pointed out the affinity of *Spencera* with the monotypic Mediterranean genus *Aremonia* (from Tyrol and Italy through the Balkan Peninsula to north-western Anatolia), from which it differs according to him "in the remarkable development of the disk . . . , in the more numerous stamens (30), in the simple not capitate stigmas and in the possession of stipular bractlets between the calyx-segments; as well as the large flowers and probably quite different habit and foliage." The affinity, I should say, is even closer; for *Aremonia* has actually also a tubular, though more fleshy, disc and stipular "bractlets" between the sepals; nor are the large flowers characteristic of *Spencera*, as there exists in the Kew Herbarium another hitherto

undescribed species* of that genus with flowers barely 1 cm. in diameter. Yet these two species have so much a facies of their own, mainly due to the peculiarly shaped leaflets, the elongated racemes and the persistent exsertion of the calyx from the involucre, whilst differing at the same time from *Aremonia* in the great number of stamens, the long-bearded carpels and the capitate stigmas, that they are marked out as a type distinct from *Aremonia*, to which we may accord generic rank. Geographically and historically *Spencera* and *Arimonia* are interesting as they suggest the addition of another relic-link between the floras of southern Europe and China-Japan. *Spencera ramalana* seems to have been raised first in this country in the R. Botanic Garden at Edinburgh from seed received from Forrest in 1911. There the plants have grown with great vigour, developed large rhizomes and flowered freely every year. They have formed quite a colony in the rock-garden where they are placed in a rather dry stony position with plenty of slope. Mr. Bulley from whose gardens at Neston, Cheshire, the material for our plate was obtained through the courtesy of Dr. Arthur W. Hill, had the plant also from Forrest and apparently from the same collecting. At Neston *Spencera* grew well in the rock-garden in soil from the kitchen-garden with a little peat added, and specimens near a ditch, so Mr. J. Hope tells us, attained to an unusual size; but they were all lost in the winter 1922-23. Considering what we know of the conditions under which *Spencera ramalana* grows in its native country it ought to be perfectly hardy here, but it evidently requires dry well-drained soil and lime rather than peat. O.S.

Fig. 1, a basal leaf, nat. size; 2, an inflorescence, nat. size; 3, a flower with the involucre, but without the petals, $\times 3$; 4, an involucre opened out $\times 3$; 5, a flower with the involucre removed, $\times 3$; 6, a stamen, $\times 5$; 7, a section through the receptacle, $\times 6$; 8 and 9, carpels in front- and side-view, $\times 6$; 10, a ripe "false fruit," $\times 4$; 11, a section through the "false fruit," $\times 4$; 12, an achene, $\times 5$; 13, an embryo, $\times 5$.

* *Spencera parviflora*, Stapf (sp. nov.); omnino habitu *S. ramalanae*, Trimen, sed vix 10 cm. alta, foliolis ad 6 (raro 8) mm. longis, foliis caulinis lanceolato-oblongis integris estipulatis, pedicellis sub anthesi vix 1 cm. attingentibus, floribus apertis 8—10 mm. diametro, involucre breviter dentato dentibus latis, receptaculi appendiceibus brevissimis obtusis distincta.

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TAB. 9008.

PHOTINIA DAVIDIANA.

China.

POMACEAE. Tribe POMARIEAE.

PHOTINIA, Lindl.; *Benth. & Hook. f., Gen. Plant.* I. 627; *Focke in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 25.

Photinia Davidiana, Cardot in *Bull. Mus. Hist. Nat. Paris*, XXV. 399 (1919); a *P. undulata*, Cardot, proxima differt foliis maioribus 5—12 cm. longis 2—4.5 cm. latis plerumque oblanceolatis vel oblongis acutis vet acute acuminatis, inflorescentiarum axibus et receptaculo subsericeo-tomentosis necnon fructu fulgide coccineo.

Frutex vel *arbuscula*, 1—10 m. altus, ramis verticillatim approximatis; ramuli novelli subsericeo-tomentosi, mox glabrati, cortice purpureo, annotini cinerascetes. *Gemmae* oblongae, subacutae, ad 6 mm. longae, rubrae, glabrae. *Folia* petiolata; lamina ex oblanceolato per oblongum ad lanceolatum vergens, basi breviter acuta vel obtusa, apice saepe mucronulata, integerrima, leviter crispo-undulata, 5—12 cm. longa, 2—4.5 cm. lata, coriacea, novella pulchre purpurascens, mox viridis et subnitida, facie ad costam tenuem et hincinde ad nervos parce adpresse pilosula, caeterum saepe iam in gemma glaberrima, nervis utrinque 10—12 tenuissimis; petiolus 1—1.5 cm. longus, facie canaliculatus et adpresse pubescens; stipulae subulatae, 5—6 mm. longae, rubrae, glabrae. *Inflorescentiae* terminales, corymboso-paniculatae, 5—8 cm. longae, vix latiores; rami subcernui, 5—3 cm. longi, inferiores ad 7-flori; bracteae et bracteolae caducae; pedicelli 4—2 mm. longi. *Receptaculum* depressio-hemisphaericum, 3 mm. altum, fere 5 mm. diametro, subsericeo-tomentosum. *Sepala* late ovata, acuta, glanduloso-apiculata, 1—1.5 mm. longa, dorso minute dense vel laxe pilosula. *Petala* alba, suborbicularia, 4 mm. diametro, abrupte in unguem brevem contracta, concava, subglabra. *Stamina* 20; filamenta subaequilonga, 3.5 mm. longa; antherae atro-purpureae, ellipticae, 1 mm. longae. *Ovarium* 5-loculare, ad vel fere ad medium in receptaculo immersum, vertice libero hemisphaerico-ovoideo piloso; carpella plerumque in centro inferne ad suturas libera, 2-ovulata; styli 5, alte connati, ultra 3 mm. longi, stigmata capitata. *Fructus* globosus, fulgide coccineus, 7—8 mm. diametro, sepalis persistentibus rubris filamentis atratis vertici libero coriaceo-crustaceo integro incumbentibus coronatus; mesocarpium aequaliter carnosum; endocarpium ad dorsum et ad latera tenuiter crustaceum et a mesocarpio facile solutum. *Semina* oblonga, obtusa, basi leviter incurva, ad 4 mm. longa, testa tenui humefacta mucilaginem exudante. *Stranvaesia Davidiana*, Decne in *Nouv. Arch. Mus. Paris*, X., 179 (1874); C. Schneider, *Handb. Laubholz*, I. 713 (1906); Rehder & Wilson in *Sargent, Plant. Wilson*, I. 192 (1912).

An evergreen *shrub* or small *tree*, 1 to 10 m. high, whose slender branches are at first silkily tomentose, but soon become glabrous and reddish. The thin leathery, somewhat wavy deep-green and slightly glossy *leaf-blades* are borne on often red and downy stalks, 1 to 1.5 cm. long; they vary from inversely lanceolate through oblong to lanceolate, have a roundish or acute base and often end in a

short straight point ; they measure from 5 to 12 cm. by 2 to 4.5 cm. and are traversed by 10 to 12 pairs of very slender nerves ; deciduous red awl-shaped stipules flank the leaf-stalk. The *flowers* are arranged in terminal rather loose slightly drooping panicles or corymbs, 5 to 8 cm. long, whose axes like the *receptacle* and the small ovate gland-tipped *sepals* are finely downy to tomentose. The rather caducous white round and concave *petals* measure about 4 mm. in diameter and they stand out almost at right angles before they drop. There are 20 *stamens* with dark-red anthers. The crown of the 5-celled *ovary* is downy and carries a shortly 5-cleft style with knob-shaped stigmas. The mature *fruits* are globose and brilliantly crimson with the persistent red sepals closing over the crown ; they measure 7 to 8 mm. in diameter and contain a thinly crustaceous 5-celled core which with the exception of the crown is surrounded by a red moderately juicy flesh. The *seeds*, 1 or 2 in each cell, are oblong, curved at the base and they measure about 4 mm. in length.

DISTRIBUTION.—Szechuan ; mountains of Mupin, from 2,300 to 2,500 m. Yunnan ; from the Likiang range to the mountains north of Lake Tali and westwards to the Mekong-Salwin divide (in Lat. $27^{\circ} 54' N.$) up to 3,000 m.

This shrub whose principal charm consists in the contrast of its brilliantly coloured fruits and dark foliage is one of Mr. Forrest's numerous introductions. He collected it repeatedly in the mountain-ranges which divide the valleys of the Yangtse, Mekong and Salwin in Lat. $27^{\circ} 54'$ to $28^{\circ} 12'$ at altitudes of 2,700 to 3,000 m. (Nos. 15058, 16990, 19454, 19464, 19697, 20977). The particular plant which provided the material for the present plate was raised from one of those collectings. Unfortunately the seed-number has been lost ; but the Marquis of Headfort to whom we are indebted for this contribution tells me that he had the plant as a seedling from the Royal Horticultural Society's Garden at Wisley in 1919, which enables us to connect it with a fair degree of certainty with Forrest's No. 15058. This was collected in the Mekong-Salwin divide in open mixed forest in November, 1917. It is here where it grows to the height

of over 10 m. Elsewhere the height is stated to vary from 3 to 6 m. in the southern, and from 1.25 to 3 m. in the northern section of the area. It reaches its northern limit on the wooded slopes of the Pan lan shan (31° N.L.), not many kilometres to the north of the mission-station of Mupin where Père Armande David discovered it in June, 1869. Professor H. Lecomte of the Museum d'Histoire Naturelle at Paris was good enough to send me a careful tracing of the original of Franchet's *Stranvaesia Davidiana*, that is David's plant. It is in fruit and agrees exactly with our plant. Professor L. Diels described a very similar form with more compact and far less hairy inflorescences as *S. Henryi*. Henry had received it from Szechuan in 1889 (No. 8953) and the same form has been collected by Faber, Giraldi and Wilson on Mount Omei and by Pratt near Tachienlu. Wilson and Schneider consider it as conspecific with *P. Davidiana*. It is not in cultivation and I am unable to say how far the characters can be relied upon. Another closely related form is *Stranvaesia salicifolia* Hutch., figured in this work on t. 8862. It has narrow leaves with almost parallel sides and short points and red fruits with a much protruding "crown." I have seen no field specimen exactly corresponding to it and its history is obscure. We may have to reconsider the status of *S. salicifolia*, and eventually also our concept of *P. Davidiana* and *P. undulata*; but, whatever the result, our plate will be helpful as an authentic illustration of the typical form of *P. Davidiana*. I have followed M. M. J. Cardot in referring our species (and *Stranvaesia undulata*; see Bot. Mag. t. 8418) to *Photinia* instead of *Stranvaesia* on account of the absence of the loculicidal dehiscence of the fruit which is the fundamental character of *Stranvaesia* as a genus as already pointed out by its author, Lindley. Conceived thus *Stranvaesia* is restricted to *S. Nussia*, Decne (*S. glaucescens*, Decne; *Pyrus Nussia*, Ham. ex D. Don), *S. Brandisii*, Stapf* (*S. sp.*, Brandis, Indian Trees, 293) and *S. oblanceolata*, Stapf (*S. Nussia* var. *oblanceolata*, Rehder & Wilson). In all these species the "crown" occupies half or more than half of the matured ovary and, splitting loculicidally

* *P. Brandisii*, Stapf. (*sp. nov.*); *P. Nussiae* similis, sed floribus minoribus et omnibus partibus glaberrima.—Burma, Ruby Mines District, Mogok, Buchanan, 151.

down to the union with the receptacle, opens with 5 triangular-ovate valves which may finally become detached, leaving behind the cup-shaped basal half of the fruit. In *Photinia* on the other hand the "crown" remains entire, and the perfectly mature fruit is frequently more of the nature of a berry. Thus defined *Photinia* comprises 30 to 40 species ranging over almost the whole of the Indo-Malayan region, West- and South-west China and the warmer parts of Japan. Morphologically the genus is very homogeneous and many of its species are closely connected. The number of carpels (and styles) is mostly 2, but 3 carpels occur occasionally in *P. Davidsoniae*, and normally in *P. obliqua* *, 4 in *P. scandens* ** and 5 in the species figured here and its immediate allies referred to above as well as in *P. Havilandii* ***. There seems to be no particular correlation between the number of styles and other salient characters. The genus *Pourthiaea* (20 to 25 species) which is sometimes reduced to *Photinia* may in my opinion be allowed to stand. It has a facies of its own which in connection with the presence of "concretions" in the mesocarp and the intense development of lenticels in the inflorescence marks it as a distinct natural group. Its area is confined to Japan and China with an extension to the eastern Himalaya. *P. Davidiana* is grown in Lord Headfort's garden at Kells, Co. Meath, Ireland, in a small clearing in an open wood under evidently perfectly congenial conditions. It flowered there for the first time early in the summer of 1922 and ripened its fruit in the following winter. There is little doubt that it will prove hardy in most parts of the country, like *P. undulata*, than which it is a much more ornamental shrub. O.S.

Fig. 1, a flowering branch, nat. size; 2, a longitudinal section of a flower, $\times 4$; 3, a petal, $\times 5$; 4, a fruiting branch, nat. size; 5, a longitudinal section of a mature fruit, $\times 3$.

(*) *P. obliqua*, Stapf (*sp. nov.*); e grege *P. glabrae*, Decne, sed foliis oblanceolatis v. oblongis 9 cm. longis 3 cm. latis nervis valde obliquis, pedicellis demum ad 1 cm. longis.—China; Fokien, Foochow, *Carles*, 839.

** *P. scandens*, Stapf (*sp. nov.*); habitu scandente disinctissima, foliis oblongo-lanceolatis acuminatis integerrimis ad 13 cm. longis et 3.5 cm. latis, fructibus rubro-atris.—China; Yunnan, Shweli-Salwin divide, *Forrest*, 9329.

*** *P. Havilandii*, Stapf (*comb. nov.* pro *Stranvaesia integrifolia*, Stapf, ob *Photiniam integrifoliam*, Lindley).

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TAB. 9009.

CHAMAEBUXUS VAYREDAE.

Spain.

POLYGALACEAE. Tribe POLYGALAEAE.

CHAMAEBUXUS, *Spach*; *Polygala*, *Benth. & Hook. f., Gen. Plant.* I. 136; *Polygala Sect. Chamaebuxus*, *DC. Prodr.* I. 331; *Chodat in Engl. & Prantl, Nat. Pflanzenf.* III. 4. 130 et *Mon. Polygal.* 93.

Chamaebuxus Vayredae, *Willk. Ill. Pl. Hisp.* 33, t. xxiii. (1881); affinis *Chamaebuxo alpestris*, *Spach*, sed foliis angustis lanceolatis vel linearibus deflexis laxe dispositis, florum colore, appendicibus cristae alte multilobulatis, capsula maiore latius alata differt.

Fruticulus raro 10 cm. multo altior, multicaulis; caules e basi procumbente ascendentes, graciles, virides, glabri vel hincinde parce minute puberuli, demum inferne efoliati. *Gemmae* axillares, ambitu obovatae vel ellipticae, circiter 2 mm. longae, perulis late ovatis vel ellipticis virescentibus ramo evoluti cito delabentibus. *Folia* inferiora breviora, inter perulas et folia perfecta intermedia, haec dissita, subsessilia, anguste lanceolata vel linearia, acuta, margine subrevoluta, 2—2.5 cm. longa, 2.5—3 mm. lata, subcoriacea, facie atro-viridia, dorso pallida, iuniora ad margines minute crispe pubescentia, costa tenui. *Flores* 1—3 in racemulos admodum abbreviatis axillares dispositi; bractaeae perulis gemmarum similes, 1 mm. vix longiores, deciduae; pedicelli graciles, ad 4 mm. longi. *Sepala* exteriora inaequalia, posticum late cymbiforme, basi subsaccatum, a latere oblongum, obtusum, 4 mm. longum, lateralia paulo breviora, planiora, elliptico-ovata, omnia membranacea, virescentia vel saepius purpureo-suffusa; sepala interiora (alae) late obovata, obtusa, basi anguste unguiculata, ad 15 mm. longa, ad 7 mm. lata, laete roseo-purpurea, ungue torto patentia. *Petala* lateralia (postica) obovato-lanceolata, oblique subtruncata, maxima parte tubo staminali adnata, 11—12 mm. longa, sub apice oblique transverse costata, colore alarum; petalum anticum (carina) cum lateralibus tubo staminali alte adnatum, parte libera globoso-galeata, ad 3 mm. longum, luteum vel ochraceum, appendice cristiformi 5-vel 7-lobulato. *Filamenta* ad 2/3 in tubum postice fissum connata (parte libera 4 mm. longa), sub antheras ipsas paulo incrassata; antherae 2-thecae, 0.6 mm. longae, demum bilabiatis apertae, in carinae galea nidulantes. *Discus* ad glandulam posticam ovoideam subdeflexam redactus. *Ovarium* sessile, a latere valde compressum, ambitu obcordatum, anguste alatum, glabrum; stylus e basi tenui sursum incrassatus, sigmatoideo-curvatus; stigma obscure 2-labiatum; labio postico maiore. *Capsula* obcordata, 10—12 mm. longa, alis eleganter venosis latiusculis inclusis 10 mm. lata. *Semina* ellipsoidea, obtusissima, nigra, 4 mm. longa, pilosula, arillo 3-partito albido, lobis lateralibus subfalcatis, intermedio carinato antice acuminato. *Cosson*, *Ill. Fl. Atl.* I. 116 (1888); *Polygala Vayredae*, *Costa*, *Supl. Cat. Fl. Catal.* 10. 91 (reimpr. e *Memor. R. Acad. Cienc. Nat. y Art. Barcelona*); *Vayreda*, *Pl. Not. Catal. in Anal. Soc. Esp. Hist. Nat.* VIII. 376, t. vii. (1880); *Chod. in Arch. Sc. Phys. et Nat.* 3me pér. XVIII. 299 (1887) et XXV. 701 (1891) et *Mon. Polygalac.* 114 (1891).

A small procumbent *shrublet* of the growth of *Chamaebuxus alpestris*, but rather taller and looser, with relatively distant deflexed *leaves* whose blades are mostly linear,

acute and slightly rolled back along the margins and measure 2 to 2.5 cm. to 3 mm. The *flowers* spring from the axils of the leaves either singly or in small very short racemes of 2 or 3; they are carried on very slender stalks about 4 mm. long. The outer *sepals* are membranous, pale green or more often purplish and 3 to 4 mm. long; the inner two sepals or "wings" are much larger, broadly and bluntly obovate from a narrow twisted claw, they are up to 15 mm. long and almost half as wide and of a bright rose-purple. The latter, two lateral *petals* and the claw of the intermediate petal or "keel" are grown for the most of their length to the back of the staminal tube; the former are obliquely obovate-lanceolate, 11 to 12 mm. long and of the same colour as the "wings," whilst the "keel" has the shape of a globose hood with a 5- to 7-cleft crest and is yellow. The *ovary* is much compressed from the sides and heart-shaped; it grows into a winged *capsule*, 10 to 12 mm. long and 10 mm. wide, including the rather wide and prettily veined wings. The few ellipsoid *seeds* are 4 mm. long and finely hairy and carry a 3-cleft aril of a peculiar shape (see fig. 9).

DISTRIBUTION.—Spain; Catalonia, on dry hills in the District of Olot.

Like *Lithospermum oleifolium* (see t. 8994 of this volume) *Chamaebuxus Vayredae* is confined to a very small area in the southern foot-hills of the eastern Pyrenees. It is recorded with certainty only from the Coll de Carreras in the eastern watershed of the Ter, a few kilometers to the north-east of Campredon and to the north of the Vall de Bach, the head of a valley whose waters flow eastwards to the Llera and Fluvia. This locality is only about 10 kil. distant from the nearest station of *Lithospermum oleifolium*. Colmeiro suggests that the "*Polygala Chamaebuxus*" of Asso from "Mt. Urguel" (between Seo de Urguel and Arfa and 75 kil. due west of Camprodon) may also be *Chamaebuxus Vayredae*, but Asso's statement has never been verified. Our plant seems to have been discovered more than a hundred years ago by the elder Bolós (Francesco Javier, 1773–1844), a citizen of Olot, the capital of the district in which the Coll de Carreras is situated; for there is a specimen

in Bolós'es Herbarium which was named "*Polygala Chamaebuxus*" by the Abbé Pourret who died in 1818. It was rediscovered by Estanislao Vayreda y Vila in 1877 and described the same year by A. C. Costa as a new species, *Polygala Vayredae*, in dedication to his friend, like himself a very active student of the Catalanian flora. The altitude of the Coll de Carreras is given as 800 m. by Willkomm, who also describes it as "bush-covered." The confusion with *C. alpestris* (*Polygala Chamaebuxus*) is not surprising as the similarity of our plant with the common species of the Alps is considerable, but the characters referred to in the differential diagnosis given above have been found sufficient to secure the general recognition of the Catalanian form as a distinct species. It is indeed more than doubtful that *C. alpestris* occurs in the Pyrenees. I have already referred to Asso's record of it. Another is by La Peyrouse (1818) who indicates it from Ceret on the French side of the eastern Pyrenees. This too has been called in doubt by Grenier and Godron and definitely refused by Bubani. On the other hand Rouy and Foucaud in their Flore de France cite two specimens as purporting to be of Pyrenean origin, one without locality in the herbarium of Martrim Donos and the other from "Ceret (Franqueville, Herb. Foucaud)." Generally, however, the French Alps are accepted as marking the westernmost extension of the area of *C. alpestris* whence the species is widely distributed through the Alps with an extension to the Apennines and with more or less isolated outposts in the Dinarian Alps, in the Carpathians of Southern Transylvania and in the hills and mountains of Bohemia and South- and Central-Germany. The discontinuous character of the area of the genus is further emphasized by the distribution of the other species of *Chamaebuxus* in the sense in which it is understood here. These are *C. Munbyana* (*Polygala Munbyana*, Boiss. et Reut.) in Algeria (Cherchel to Oran), *C. Webbiana* (*P. Webbiana*, Coss.) in North Morocco (Tetuan) and the extremely xerophytic *C. Balansae* (*P. Balansae*, Coss.) on the slopes of the Great Atlas. Thus limited, *Chamaebuxus* represents an obviously natural and well defined genus. Probably of general distribution in the pre-glacial Mediterranean belt,

its area is now badly broken up and in the western half it is apparently doomed to extinction. The conception of *C. alpestris* as the type of a distinct genus is no innovation. It originated with the pre-Linnean writers (Bauhin, Clusius, Tournefort); it was obliterated in the artificial system of Linnæus; it was revived by Spach (1839), confused by Hasskarl (1848) in an attempt to place a number of Indo-Malayan shrubs, and merged again in a wide concept of *Polygala* which became the vaguer the more it was made to cover (10 sections with 28 subsections and about 400 species in Chodat's monograph, 1891). The inevitable reaction set in with Willkomm (1878)* and some of the best of the modern floras have followed him.

For the material from which the present plate was prepared we are indebted to Sir John Ross of Bladensburg of Rostrevor, Co. Down, Ireland, who has had the plant in cultivation for many years. The plant is perfectly hardy and requires the same treatment as *C. alpestris* which for obvious reasons is more frequently seen in gardens. *C. Vayreda* rivals if it does not surpass as a rock-plant the purple-flowered form of *C. alpestris*; it spreads well, forms a good carpet and blooms freely. It flowers in its home late in April and in this country late in May, while in the Alps, *A. alpestris* is one of the early harbingers of spring.

O.S.

Fig. 1, flowering stems, nat. size; 2, young leaves, $\times 2$; 3, a flower, $\times 2$; 4, a corolla, spread out with stamens and pistil enclosed in the carinal petal, $\times 3$; 5, *a-d*, stamens in various stages and positions, $\times 16$; 6, a pistil in side-view, $\times 3$; 7, a young fruit, $\times 6$; 8, the same in section, $\times 6$; 9, a seed (after Willkomm, III. Plant. Hisp.), $\times 16$.

* Willk. & Lange, Prodr. Fl. Hisp., III. pars. iii. 55.

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TAB. 9010.

PIMELEA PROSTRATA.

New Zealand.

THYMELAEACEAE. Tribe PIMELEEAE.

PIMELEA, Banks & Solander ex Gaertn.; *Benth. & Hook. f., Gen. Plant.* III. 189; *Gilg in Engl. & Prantl, Nat. Pflanzenf.* III. 6a. 242.

Pimelea prostrata, Willd., *Spec. Plant.* I. 57 (1797); *P. Urvilleanae*, A. Rich., proxima, quae differt tomento ramorum florumque densissimo niveo et foliis crassioribus.

Fruticulus prostratus vel suberectus, ramosissimus; rami interdum in mattam laxam intricati, rarius in pulvinum coarctati, primarii saepe perlongi, secundarii breves, iuniores dense adpresse albo- vel- subgriseo-hirsuti vel tomentosi, vetusti tarde glabrati, cortice rugoso brunnescente vel fuscescente. *Folia* decussata, in ramis secundariis quadrifariam congesta, sessilia, oblonga, obtusa, 5—6 mm. longa, 2—2.5 mm. lata, coriacea, glabra, matura atroviridia, summa vix latiora et pallidiora, omnia in axilla comam pilorum brevium alborum gerentia. *Flores* polygamo-dioici, albi, suaveolentes, ad ramulorum lateralium apices capitatum congesti, capitulis saepe multifloris. *Perianthium spurium* extra albo-villoso-sericeum, diu persistens; receptaculum (tubus) 2—3 mm. longum, basi magis minusve ampliatur; sepala 4, obovata, 1—2 mm. longa. *Petala* nulla. *Stamina* 2; filamenta in ore tubi inserta, in flore ♀ brevissima, caeterum ad 0.6 mm. longa; antherae in flore ♀ imperfectae, saepe valde reductae, minutae, caeterum ad 0.6 mm. longae. *Ovarium* ovoideo-ellipsoideum vel oblongum, apice breviter comosopilosum; stylus iuxta apicem ovarii ortus, demum 1.5—1.8 mm. longus, exsertus; stigma capitatum, papillosum vel in flore ♂ minutum et fere glabrum. *Fructus* drupaceus, subglobosus, 2.5 mm. diametro, diu perianthio spurio emarcido vestitus; putamen lenticulare, oblique orbiculari-ovatum, 1.5 mm. diametro. A. Richard, in *Voyage de l'Astrolabe*, Bot. (Ess. Fl. Nouv. Zel.) 174 (1832); Hook. f., *Fl. Nov. Zel.* I. 220 (1854) et *Handb. New-Zeal. Fl.* 244 (1864); *P. laevigata*, Gaertn. *Fruct.* I. 186, t. 39, fig. 1 (1788); Cheeseman, *Man. N. Zeal. Fl.* 61 (1906), non Linn. *Banksia prostrata*, J. N. & G. Forster, *Beschr. Gatt. Pfl. Ins. Süd-See*, 8 (1779). *Passerina prostrata*, Linn. f., *Suppl.* 227 (1771); Forst. *Prodr.* 172 (1786). *Cookia prostrata*, Gmel. *Syst.* 24 (1791).

A low much branched *shrub* with often very long main-branches and numerous short side-branches, or more or less erect, loosely matted or forming cushions, appressedly silky or tomentose on the young branches and in the leaf-axils; the old bark reddish-brown to dark grey. The oblong and blunt leathery leaves are sessile and crowded in four ranks in the younger parts and particularly on the side-branches or more loosely arranged in decussate pairs in the older parts of the main-branches; they are quite glabrous and dull green. The white sweet-scented *flowers* are collected into small heads at

the ends of the side-branches ; they are slightly dimorphic and polygamo-dioecious, some individuals bearing mostly hermaphrodite, others mostly (or only ?) female flowers, the latter being generally smaller. The externally silky "perianth" consists of a tube, 2 to 3 mm. long, and of 4 obovate *sepals*, measuring 1 to almost 2 mm. by 1 mm. There are no *petals*. The 2 *stamens* are inserted in the throat of the "perianth" and have either perfect oblong anthers up to 0.6 mm. long and borne on filaments of almost equal length (hermaphrodite flowers), or the anthers are imperfect and very small with very short filaments (female flowers). The *ovary* is ovoid-oblong with the threadlike style rising by the side of the hairy top and carrying the pin-head-like stigma beyond the anthers. The *fruit* is a small drupe with a lentil-shaped stone, long enclosed in the dried-up "perianth."

DISTRIBUTION.—The typical form in the North Island, particularly on the coast, other forms in the interior of the North Island and all over the South Island.

This is the only species of *Pimelea* which so far has been grown in the open air at Kew, although there is apparently no reason why other New Zealand species should not succeed equally well. *Pimelea prostrata* is a common element in the vegetation of the coast of the North Island of New Zealand, either growing in the shingle or on the dunes and cliffs of the shore and varying much in appearance according to the nature of the habitat. In parts of the interior of the North Island and throughout the interior of the South Island it is represented by very similar forms, some of which have been described as distinct species (*P. rugulosa*, *P. microphylla*, *P. bicolor*, *P. heterophylla*). Typical *P. prostrata* as well as these subsidiary or doubtful forms follow there the shingly beds of rivers or enter heath-like formations, ascending occasionally to considerable altitudes. They are still imperfectly understood and their taxonomic status is an open question which for its solution requires field-work and experiment for which the younger school of New Zealand botanists is admirably equipped. It may, however, be remarked that the ample material from the South Island, preserved in the Herbarium at Kew, has

throughout a peculiar facies which, in the smaller specimens, recalls *Euphorbia chamaesyce* and suggests more than a mere phase of an unstable unit. The discrimination of these forms is also rendered difficult by the somewhat vague dimorphism of the flowers which, moreover, are polygamo-dioecious. G. M. Thomson* who has studied the plant in the field distinguishes (1) truly hermaphrodite flowers, (2) functionally male flowers with long exserted anthers and with a small ovary that lengthens when the anthers have dehisced and carries a minute almost glabrous stigma, and (3) functionally female flowers with minute shrivelled subsessile anthers and a capitate hairy or papillose stigma on a long exserted style. The plant represented here has flowers of the first type, and it fruited the year before it was drawn, but not during the winter 1923-24, probably owing to its severity. Most of the herbarium material examined was apparently of the same type, bearing in not a few cases mature fruits whilst a number of specimens were of the third type and at once recognisable by the small flowers. Functionally male plants were probably present too, but they are difficult to recognise in dried plants. The bearing of these conditions on the raising of seed in cultivation is obvious. However modest the flowers of *Pimelea prostrata* may appear in our plate, their effect when seen *en masse* may be gauged from a photograph of a cushion of a specimen observed by C. A. Foweracker† in the shingle-bed of the Cass River, Canterbury Division. It measures 50 cm. in diameter and it is completely smothered with flowers. The same author points out that the main-root of *P. prostrata* penetrates generally to a considerable depth (60 cm. in one case) so that the plant becomes to a high degree independent of the fluctuations of the water-table in the subsoil.

The plant from which our plate was prepared has been in cultivation at Kew for a number of years. It was originally grown in a pot, but did not thrive well. Three years ago it was planted out in a sheltered recess outside the Temperate House where it has since flowered freely.

* G. M. Thomson in Trans. New. Zeal. Inst., XIII. 282 (1880).

† C. A. Foweracker in Trans. New Zeal. Inst., XLIX. 38 (1916).

A protected corner in a "moraine" or a rock-garden with plenty of depth and with ground-water within reach would probably be a more suitable place.

Fig. 1, a part of a plant, nat. size ; 2, a cluster of flowers, $\times 4$; 3, a flower, $\times 8$; 4, a flower, cut open, $\times 8$; 5, perfect anthers, $\times 16$.

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pseudobulbs ; they consist of a short sheathing base and a broadly oblong apiculate blade, up to 6 cm. long and 1·8 cm. wide, very bright green and smooth, a fine transverse green or purplish line marking the articulation of the blade with the sheath. The brilliantly coloured *flowers* (2·2 to 2·4 cm. long) are carried, mostly in pairs, more rarely singly or in threes, on specialised very short bracteate shoots rising laterally from the shorter pseudobulbs. The six-grooved slender *receptacle* measures, together with the short flower-stalk, 1·5 cm. in length. The *sepals* and *petals* are similar in shape, size and colour—a bright carmine—except that the lateral sepals are very oblique at the base owing to their being adnate to and continued along the slender chin which is adpressed to the receptacle, and that the petals are rather obovate than ovate and very blunt ; the sepals and petals exclusive of the oblique base of the lateral pair of the former measure about 12 mm. by 5 to 6 mm. The somewhat pointed or obtuse *lip* is boat-shaped with a long attenuated base and only slightly exceeded by the lateral sepals ; the lip is very pale at the base and yellow to orange with a flush of carmine in the upper exposed part. The *column* is short and minutely toothed. The *anther* which is borne on a slender short filament is whitish with a maroon-coloured front. The *pollinia* are oblong and 1·5 mm. long.

DISTRIBUTION.—Louisiades Archipelago, hills of Rossell Island.

Dendrobium laevifolium is a recent introduction by Sir Jeremiah Colman of Gatton Park, Reigate, to whose courtesy we owe the opportunity of figuring this most charming plant. It was collected by Mr. J. C. Frost on Rossell Island, one of the Louisiades, an archipelago of small islands situated in the direct continuation of the south-eastern-most point of New Guinea. It grows there, so Sir Jeremiah informs me, on moss-covered saplings, only 6 to 7 cm. in diameter, in the mist-belt of the mountains at an altitude of 360 to 450 m. and in a perpetually moist atmosphere.

Dendrobium laevifolium has so much in common with *D. asperifolium* with which it has been compared above

that Dr. J. J. Smith of Buitenzorg, the author of that species, to whom I submitted a fragment of a flowering specimen of our plant, considered it as a mere variety of it; but the anatomical structure of the leaf and to a lesser degree the shape of the lip afford sufficient characters for specific distinction. *D. asperifolium*, of which Dr. Smith was good enough to communicate to me a leaf of the original preserved in spirit, owes its name to the presence of small wart-like protuberances on the leaves, the receptacles and other parts. These are due to the enlargement of cell-groups after the manner of palisade-cells immediately below the epidermis; they are absent in *D. laevifolium* whose leaves appear therefore perfectly smooth. Both species, however, possess the minute pits (described as "*puncti impressi*") and these require a few words of explanation. They are small funnel-shaped depressions in the epidermis which hold the basal cell of a minute hair that breaks down very early. Möbius in a paper in Vol. XVIII. of Pringsheim's Jahrbücher has fully described these hairs which according to him are typical of certain groups of *Dendrobium* and may therefore be of some taxonomic value.

Dendrobium laevifolium belongs to the section *Oxyglossum* which comprises over 50 species, all but a few endemic in New Guinea. They are noteworthy on account of their general habit of which our species is a characteristic example and of the fact that a number of them which moreover have showy flowers grow in assemblages large enough to become attractive objects in the scenery. According to Schlechter they are, like our species, generally confined to the mist-belt of the mountains, but in the south-eastern part of Dutch New Guinea, for instance on Mount Goliad, they occur at all levels up to the summit, often growing on rocks.

The discovery in the Louisiades of an *Oxyglossum-Dendrobium* so similar to *D. asperifolium* that it might be confused with it suggests the presence of other allied species in the intervening area, a region extending over 1,500 kil. from west to east, although so far comparatively few dendrobiums have become known from south-eastern New Guinea, no doubt mainly because its botanical exploration is deplorably incomplete. But, however much

we may still expect from that quarter, such knowledge as we have seems to suggest that it will never rival the extraordinary wealth which the genus displays in the western and northern sections of the island. There the recent work of Dr. Rudolf Schlechter in "German" New Guinea and of Dr. J. J. Smith for Dutch New Guinea has revealed an abundance of orchids generally, which is unsurpassed in any other part of the world of equal size. Among them *Bulbophyllum* and *Dendrobium* take the first places, *Dendrobium* alone accounting already for over 400 species, distributed over a score of sections, against the 55 species of Java and the 158 species of the Flora of British India; yet neither of those sections of New Guinea can be said to have been more than "tapped."

The cultivation of *D. laevifolium* does not appear to be difficult as long as it is in harmony with the conditions of its native habitat. Mr. J. Collier, Sir Jeremiah's gardener, writes that at Gatton Park *D. laevifolium* is planted in a shallow pan suspended high up near the glass-roof of a house with intermediate temperature and a rather moist atmosphere and it is never allowed to go very dry. Under such conditions it thrives very well and flowers freely and regularly. O.S.

Fig. 1, a whole plant, nat. size; 2, a flower with its bract, $\times 2$; 3, the same with one of the lateral sepals and a petal removed, $\times 2$; 4, the lip, somewhat flattened out, $\times 3$; 5, tip of the lip flattened out, $\times 3$; 6, column in front-view, $\times 4$; 7, anther, $\times 8$.

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TAB. 9012.

CENTRADENIA FLORIBUNDA.

Central America.

MELASTOMATACEAE. Tribe MICROLICIEAE.

CENTRADENIA, G. Don; *Benth. & Hook. f., Gen. Plant.* I. 739; *Cogn., Melast. in Cas. DC., Mon. Phan.* VII. 116; *Krasser in Engl. & Prantl, Nat. Pflanzenf.* III. 7. 151.

Centradenia floribunda, *Planchon in Fl. des Serr.* v. t. 543 (1849); a caeteris speciebus generis staminibus subaequalibus differt.

Herba perennis, multicaulis, 2—4 dm. alta, caulibus multiramosis erectis obscure tetragonis rubescentibus parce strigilloso-pubescentibus vel tandem glabratiss, novellis praeterea glanduloso-pilosulis. *Folia* cuiusque iugi aequalia vel magis minusve (interdum maxime) disparia; lamina late oblongo-lanceolata vel lanceolata, acuta vel acute acuminata, sensim in petiolum contracta, maior 4—8 cm. longa, 0·8—2·5 cm. lata, minor interdum 1 cm. haud attingens, membranacea, viridis, utrinque laxa vel parce pilosula, ad margines ciliolata, 3-nervis; petiolus sanguineo-purpureus, brevis vel foliorum maiorum ad 5 mm. longus. *Cymae* helicoideae, ad caules summos in corymbum ad 5 cm. latum saepe multiflorum collectae, ad ramulorum apices pauciores, corymbulosae, tandem elongatae et laxa racemiformes, omnibus partibus (receptaculo et calyce inclusis) glanduloso-puberulae; bracteae lineares vel oblongae, tenuissime membranaceae, pallidae, ad 4 mm. longae, caducissimae; pedicelli graciles, ad 5 mm. longi. *Receptaculum* late campanulatum, subquadrangulare, 4 mm. longum, fere ad medium ovario adnatum, abhinc in tubum productum. *Sepala* late ovata, obtusiuscula, 1 mm. longa. *Petala* late elliptica vel obovato-rotundata, ad 7 mm. longa, 5 mm. lata, pallide rosea. *Stamina* 8; filamenta 3 mm. longa, purpurascens; maiorum antherae oblongae, obtusae, apice poro dehiscentes, ad 1·5 mm. longae, connectivo basi ad 0·5 mm. producto antice truncato et minute denticulato, minorum antherae simillimae nisi breviores et pro rata latiores, appendice antico minute 2-dentato. *Ovarium* 4-loculare, ad septa receptaculo late adnatum, vertice convexo 4-lobato sursum 4-carinato styli basin annulo glanduloso-pilosulo cingente; stylus purpureus, antheras paululo superans; stigma punctatum. *Capsula* in receptaculo paulo aucto inclusa, 3 mm. longa, 4-valvis, polysperma. *Semina* oblonga, papilloso-asperula, 0·3—5 mm. longa. *Triana* in *Trans. Linn. Soc.* XXVIII. 33, t. i. fig. 15B (1871); J. Donnell Smith, *Enum. Pl. Guatemal.* II. 20 (1891), III. 26 (1893); *Cogn. in Cas. DC., Mon. Phan.* VII. 118 (1891); Boynton in *Addisonia* II. t. 73 (1917).

A perennial much branched *herb* with reddish slightly four-angled stems up to 4 dm. high. The *leaves* of each pair are equal or more often unequal, in which case one is not unfrequently very small; the membranous green and sparingly hairy blades are oblong-lanceolate or lanceolate, gradually narrowed into the short blood-red stalk and sharply pointed at the other end; the larger of them are 4 to 8 cm. by 0·8 to 2·5 cm. The *flowers* are arranged in cymes which are grouped in many flowered

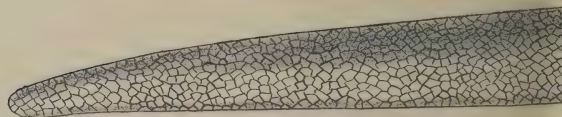
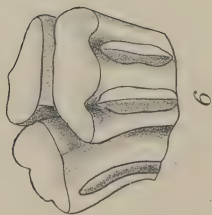
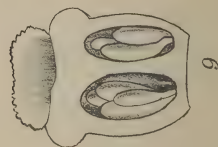
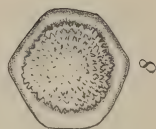
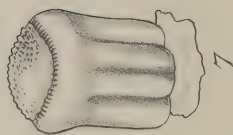
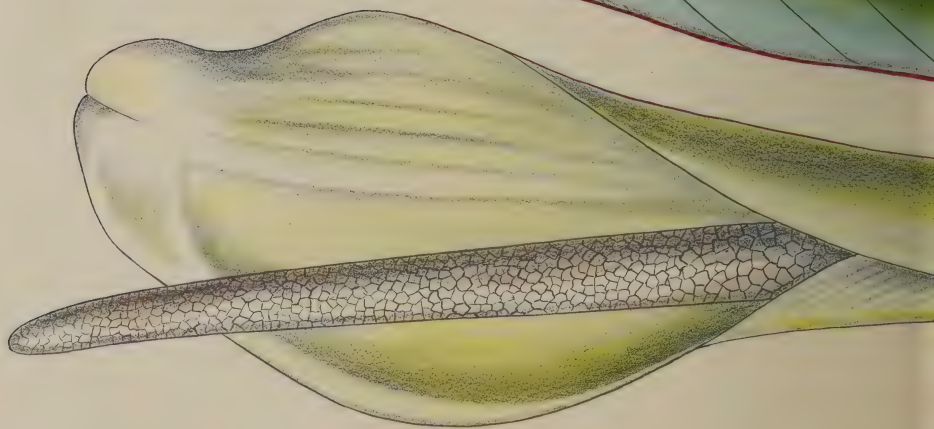
corymbs at the ends of the stems and main-branches or terminate the numerous branchlets, the cymes lengthening out gradually into loose false racemes; all parts of the inflorescence are loosely covered with gland-tipped hairs. The *receptacle*, together with the 4 short ovate *sepals*, is 4-5 mm. long and bell-shaped. The spreading pale pink *petals* are roundish-elliptic and up to 7 mm. long. There are 8 almost equal *stamens* with short blunt pale-yellow anthers which are attached to the pinkish filaments by a short downward continuation of the connective which projects in front slightly beyond the attachment, ending with a more or less toothed process. The 4-celled *ovary* is united with the receptacle over the dissepiments up to the middle; it has a slightly 4-lobed crown from the centre of which the style rises surrounded by a ring of minute gland-tipped hairs. The thin-walled *capsule* is enclosed in the slightly enlarged receptacle and emits the small reddish-brown rough *seeds* by 4 valves.

DISTRIBUTION.—Guatemala, from 300-2,400 m.; also western Honduras.

This plant became first known through van Houtte of Ghent who had received seeds of it from Guatemala from which he raised the plant described by Planchon as *C. floribunda*. It has since frequently been collected in many parts of Guatemala at altitudes from 300 to over 2,400 m. and also in the adjoining part of the Republic of Honduras. Unfortunately the collectors have not informed us under what conditions this charming plant grows in its home. In cultivation it is generally treated as a stove-plant, but the high altitude at which it is found occasionally in Guatemala suggests that it might be equally suitable for a temperate green-house. It can be reproduced either from seed, which it produces freely, or from cuttings. It thrives in rich leaf-mould mixed with sharp sand, but it requires sun-light for the perfection of its flowers. The particular specimen from which our plate has been drawn was grown at Kew where our plant has been in cultivation for many years. The flowers are somewhat delicate and do not last long, but the great number in which they are produced and the long period of flowering compensate amply for their frailty.

Centradenia comprises as known at present five species, all natives of Central America and the southern states of the Mexican Republic. One of them, *C. grandiflora*, a more robust plant of rather different appearance with winged stems and large asymmetric leaves has been figured in the Botanical Magazine (t. 5228). The other species of which *C. inaequilateralis*—in gardens sometimes known as *C. rosea*—has been long in cultivation, resembles our plant except for the marked dimorphism of the anthers. *Centradenia* is the only genus of the large tribe *Microlicieae* which is found outside of South America apart from the remarkable instance of *Rhynchanthera mexicana* which has been collected at Panama and in the State of Vera Cruz, whilst the bulk of the genus is confined to Brazil and the Guyanas.

Fig. 1, a flowering stem, nat. size; 2, a flower in side view, $\times 2.5$; 3, a flower opened out with the pistil removed, $\times 2.5$; 4, one of the larger stamens, $\times 10$; 5, one of the smaller stamens, $\times 10$; 6, pistil with the receptacle removed, $\times 5$; 7, the crown of an ovary surrounded by the calyx, $\times 8$; 8, section through a receptacle and ovary, $\times 7$.





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TAB. 9013.

PHILODENDRON TERETIPES.

Colombia.

ARACEAE. Tribe PHILODENDREAE.

PHILODENDRON, Schott; Benth. & Hook. f., Gen. Plant. III. 978; Engl. in Cas. DC. Mon. Phan. II. 355 et in Engl. & Prantl, Nat. Pflanzenf. II. 3. 132 et in Engl., Pflanzenreich IV. 23 Db. 1.

Philodendron teretipes, Sprague in Kew Bull. 1916, 197; *P. Glaziovii*, Hook. f., simile, sed petiolis plane teretibus, foliorum laminis angustioribus inaequaliter nervosis, inflorescentia brevissime pedunculata, loculis pauci-ovulatis necnon habitu distinctum; inter species Andinas prope *P. stenophyllum*, Krause, ponendum a quo vero distat foliis minoribus, spatha multo longiore flavescente et spadice sectionum ratione.

Herba epiphytica; caulis descendens, 15 cm. longus, teres, ad 1.5 cm. crassus, internodiis brevibus superioribus 2—1 cm. longis. *Folia* patula; lamina oblongo-lanceolata, acute acuminata, basi anguste subrotundata, 14—28 cm. longa, 4—7 cm. lata, pulchre viridis, subnitida, marginibus rubris, nervis primariis utrinque ad 16 quam intermedii distinctioribus angulo 50°—60° abeuntibus, costa inferne crassa; petiolus teres, 15—20 cm. longus, sub apice ita curvatus ut lamina pendula fiat, ima basi per 1.5 cm. vaginans, superne rubescens vel ruber. *Pedunculus* vix ullus vel ad 2 cm. longus, ad 8 mm. crassus. *Spatha* apogeotropica, e basi anguste involuta sensim ampliata et aperta, obovato-oblonga, obtusa vel breviter cuspidata, 14—17 cm. longa et 5—7 cm. lata, pallide flavescens, basi ad spadice insertionem late sanguineo-maculata. *Spadix* subsessilis, basi per 4.5 cm. spathae oblique adnatus, cylindricus, 8.5—18 cm. longus, ad 1.5 cm. diametro. *Inflorescentia* ♀ 2—4.5 cm. longa, fusciscenti-aurea. *Pistilla* breviter obovoidea, 1.5—2 mm. longa, stigmatibus orbiculari 1 mm. diametro; loculi circiter 10; ovula in quoque loculo 3 vel 4 funiculo longiusculo dense pilosulo e placenta stipitiformi orto suffulta, mucro copioso induta. *Inflorescentia* ♂ sordide albida. *Flores* subtriandri. *Antherae* late oboconicae apice late truncatae, 1.7 mm. latae. *Fructus* ignotus.

This is an *epiphyte* with a short cylindric closely noded descending stem whose leaves (5 to 7) stand out almost at right angles on reddish or bright-red stalks, 15 to 20 cm. long and 1 cm. thick at the base and so curved in the upper part that the blades become deflexed. The *blades* are lanceolate-oblong, acutely acuminate, narrowed towards the rounded base and they measure 14 to 28 cm. by 4 to 7 cm.; they are slightly glossy and beautifully green with red margins and they have a stout midrib and numerous close and fine nerves among which about 16 on each side are slightly more prominent than the rest. The *spathe* is borne upright on a very short stout stalk, and opens out gradually from a narrow tube; it is obovate-oblong, blunt or shortly cusped and of a

rich creamy colour with a large crimson blotch around the insertion of the spadix and it measures up to 17 cm. by 5 to 7 cm. The cylindric *spadix* is obliquely adnate to the spathe which it equals or slightly exceeds and it is up to 1.5 cm. wide. The *female* portion is 2 to 4.5 cm. long and densely covered by the shortly obovoid *pistils* with their golden- or brownish-yellow circular stigmas, the ovaries being 10-celled with 3 or 4 ovules in each cell. The *male* portion which occupies the remainder of the *spadix* is dull or dirty white and covered by the closely packed and broadly truncate *anthers*.

DISTRIBUTION.—Colombia (exact locality unknown).

The plant figured in the accompanying plate appeared accidentally in the Botanic Gardens at Glasnevin with a plant of *Zygopetalum Sanderianum* which had been purchased from Mr. O'Brien in July, 1911. As the *Zygopetalum* was introduced from Colombia it appears safe to assume that our plant has the same origin, and the more so as its morphological characters connect it rather closely with a small group of Andine species, extending from Colombia to Bolivia. The resemblance with *P. Glaziovii* (Bot. Mag. t. 6813) is rather striking at the first glance, but the short descending stem, the narrower leaves, the subsessile spathes with their perfectly cylindric petioles and the small number of ovules in each cell remove it clearly from that Brazilian species.

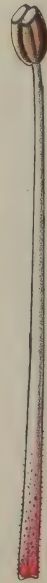
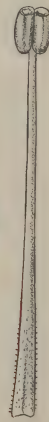
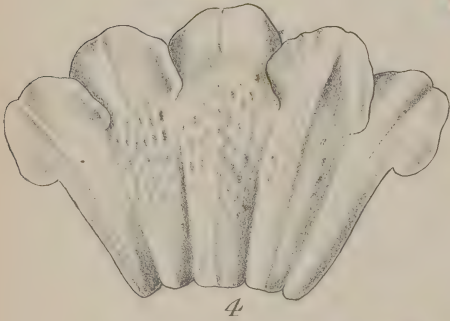
P. teretipes is grown at Glasnevin in an orchid pan and flourishes, so Mr. Besant writes, "in the temperature of the Masdevallia House under much cooler conditions than the majority of philodendrons."

Fig. 9 of our plate was drawn with the outlines of the ovules obscured by the mucilage which fills the ovary cells. Another figure (10) has therefore been added to show their shape and attachment to the densely hairy funicles. It is evidently those hairs which secrete the mucilage.

O.S.

Fig. 1, a whole flowering plant hanging from the pan in which it was grown, $\times \frac{1}{8}$; 2, a leaf; 3, a spathe with spadix; 4, the base of a spathe cut open to show the oblique attachment of the spadix; 5, a spadix (figs. 2 to 5, nat. size); 6, three stamens, representing a flower; 7, a pistil, in side view; 8, the same seen from above; 9, the same in longitudinal section (figs. 6-9, $\times 10$); 11, ovules, freed from mucilage, $\times 15$.

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TAB. 9014.

RHODODENDRON APODECTUM.

China.

ERICACEAE. Tribe RHODODENDREAE.

RHODODENDRON, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron apodectum, *Balf. f. & W. W. Smith in Notes Bot. Gard. Edinb.* X. 83 (1917); arcte affinis *R. dichroantho*, Diels, et *R. sanguineo*, Franch., sed ab utroque foliis basi rotundatis vel subcordatis pro rata latioribus in dorso potius griseis vel griseo-fuscis et obscure nervatis distinctum, a posteriore insuper calyce membranaceo, corolla magis tubulosa, filamentis puberulis differt.

Frutex ad 2.5 m. altus; ramuli subortuosi, crassiusculi, iuniores parce niveo-floccosi, annotini glabrati, cortice griseo. *Gemmae* obovoideae, acuminatae, circiter 5 mm. longae; perulae extimae ovato-lanceolatae, subulato-acuminatae, magis minusve niveo-floccosae. *Folia* petiolata; lamina elliptica vel oblongo-elliptica, basi rotundata vel subcordata, apice obtusa vel subobtusa, hydatoda callosa apiculata, 3—7 cm. longa, 1.7—3.5 cm. lata, crasse coriacea, ad marginem revoluta, facie viridis, glaberrima, nitida; costa et nervis lateralibus et venarum rete tenui arcto impressis, dorso obscure nervosa, sordide grisea vel pallide griseo-fusca, indumento tenui compacto e pilis arctissime intertextis constituto, pilis e stipite brevissimo radiatis, radiis 5—10 elongato-vesiculosus; petiolus 5—15 mm. longus, primo albo-floccosus, deinde glabratus. *Flores* 1—3 in pedunculo brevissimo umbellati; perulae rotundatae, acuminato-apiculatae, coriaceae, ad 9 mm. longae; bracteae obovato-ellipticae; bracteolae filiformes, 6—12 mm. longae, tenuiter fulvo-tomentosae; pedicelli ad 2.5 cm. longi. *Calyx* cupularis, carnosulus, irregulariter 5-lobatus lobis magis minusve rotundatis inaequalibus 8—12 mm. longis, glaber, coccineus vel partim flavescens. *Corolla* tubuloso-campaulata, aurantiaco-coccinea vel coccinea, carnosula, glabra, tubo 2—3 cm. longo intra inter nectaria bilamellato lamellis per paria apice iunctis latiusculis ad 7 mm. longis alte in tubum intrusis, lobis 5 erecto-patentibus rotundatis 1—1.4 cm. longis 1.2—1.4 cm. latis. *Stamina* 10, inaequalia, longiora ad 3 cm. longa; filamenta alba vel basi rubescentia, inferne paulo dilatata et magis minusve papillosa; antherae atrae vel fusco-purpureae, ad 2.5 mm. longae. *Ovarium* ovoideum, 5-sulcatum, 6—7 mm. longum, virescens, dense pilis fasciatis exsiccando fulvescentibus obtectum; stylus ad 3 cm. longus, viridis, stigmate vix expanso. *Capsula* nigricans, rufo-floccosa, 1.5 cm. longa, 6 mm. lata. Millais, *Rhodod.* 115 (1917), second ser. 1924; Wilding, *Rhododendrons*, 6 (1923).

This is a *shrub* about 2 m. high with somewhat tortuose stout branches which, when young, are slightly cobwebby. It has inversely egg-shaped acuminate *leaf-buds* about 5 mm. long. The stalked *leaves* have more or less elliptic blades rounded or almost heart-shaped at the base and obtuse at the apex which terminates in a callous point; they are leathery with revolute margins dark green and perfectly glabrous above and greyish

or brownish-grey on the back with the peculiar hair-covering of the "*sanguineum*" series described below, and they measure 3–7 cm. by 1·7–3·5 cm.; the stout stalks are 5–15 mm. long. The *flowers* are solitary or grouped in twos or threes, supported by broadly elliptic bracts up to 17 mm. long and by filiform bracteoles 6–12 mm. long. The *calyx* is cup-shaped, irregularly 5-lobed, 8–12 mm. long, glabrous and scarlet or in part yellowish. The *corolla* is tubular-bell-shaped, somewhat fleshy and of a brilliant or yellowish scarlet, the tube measuring 2–3 cm. in length, whilst the 5 rounded lobes are 1–1·4 cm. by 1·2–1·4 cm. There are 10 unequal *stamens* with filaments up to over 3 cm. long and minutely puberulous at the slightly widened base. The *ovary* is oblong-ovoid, 6–7 mm. long, 5-grooved, green and densely covered with short fascicled hairs; the green style measures 3 cm. in length. The *capsule* is 1·5 cm. long.

DISTRIBUTION.—Yunnan; mountains of the Shweli-Salwin divide (about 3,000 to 4,000 m.).

This "welcome" (*ἀποδεκτον*, hence its name) species is a member of the "*sanguineum*" series which is mainly characterised by the complete matting of the hairs on the underside of the leaves into a smooth crust, the hairs consisting of a number of elongated unicellular bladder-like branches radiating from a short stalk; in old leaves this crust often resembles dull or slightly tarnished silver. To this may be added the tubular-bell-shaped 5-lobed somewhat fleshy and brilliantly coloured corollas. In the latter character it approaches very closely to the "*haematodes*"-series which but for the looser more fluffy and often partly evanescent hair-covering of the underside of the leaves would be difficult to distinguish from the "*sanguineum*"-rhododendrons. Both series seem to be confined to the high mountains which form the water-sheds between the rivers Irawady, Salwin, Mekong and Yangtse from approximately 25° to 29° N. Lat. At least twenty-five species have become known of the "*sanguineum*" series from that comparatively small area, and the majority of these were found in the northern section of the area (28° 12' to 28° 40'). They are all very closely allied, but considered distinct

enough to be recognised at present as definite genetic units of "specific" rank. Mr. Forrest collected *R. apodectum* many times, but always in the Shweli-Salwin divide ($25^{\circ} 20'$ to $25^{\circ} 40'$ N. Lat.), where he discovered it in 1912 growing in open situations among rock and scrub at altitudes from 3,000 to 4,000 m., whilst *R. dichroanthum* seems to be confined to the Tali-range and *R. sanguineum* has so far been recorded only from the northern section of the "*sanguineum*" area. Professor W. Wright Smith in a letter to me refers the following later* numbers of Forrest's collections to our species—12094, 15932, 16008, 17560, 17764, 18172, 18453, 18858. To these has to be added 18320 (see explanation of plate) dated July 1919. Miss Snelling's drawing (except Fig. 3) was made on May 11th, 1920, from material communicated to Professor Balfour by Mr. E. J. P. Magor of St. Tudy, Cornwall, who has raised the plant from seed under "Forrest No. 9054"; it has very kindly been placed at our disposal by the Professor's successor and collaborator, who writes that the plant is perfectly hardy at Edinburgh but a slow grower. It develops quickly in the south and flowers there much earlier. Mr. Magor tells me that with him it makes its shoots when danger of frost is over and that it prefers a somewhat dry soil in the damp climate and heavy ground of his district, otherwise rotting of the crown and roots sets in. Mr. Millais, on the other hand, considers moisture in the soil as a favourable factor, and it certainly does well in moist but light soil in Mr. Lionel de Rothschild's garden at Exbury, Hants. O.S.

Fig. 1, top of a flower-branch seen from above, nat. size; 2, branch in side-view, from a dried specimen of Forrest, 18320, nat. size; 3, a flower in front-view, nat. size; 4, a corolla flattened out and seen from without, nat. size; 5, a pistil, $\times 3$; 6, stamens, $\times 3$; 7, a hair from the back of a young leaf, $\times 25$.

*The numbers quoted with the original description are 8987, 9054, 11896, 11968.

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TAB. 9015.

DENDROCHILUM UNCATUM.

Philippines.

ORCHIDACEAE. Tribe COELOGYNINAE.

DENDROCHILUM, *Blume*; *Benth. & Hook. f., Gen. Pl.* III. 506; *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 180 et *Nachtr.* III. 155. *Platyclinis*, *Benth.*; *Benth. & Hook. f.* 1. c. 496; *Pfitzer*, 1. c. II. 6. 128; *Pfitzer & Kränzlin in Engl., Pflanzenreich* IV. 50. IIb. 7. 86.

Dendrochilum uncatum, *Reichb. f. in Bonplandia*, III. 222 (1855) et in *Gard. Chron.* XVI. 780 (1881); inter species sectionis *Platyclinis* labelli lobis denticulatis notatas labello praeter basin applanato et columnae brachiis medio ortis insignis; a *D. filiformi*, *Lindl.* quocum comparatum fuit floribus viridibus, petalis minute denticulatis et labii lobis conspicue eroso-dentatis differt.

Herba plerumque epiphytica, dense caespitosa, 12—20 cm. alta; pseudobulbi ambitu ovato-oblongi vel oblongo-lanceolati, teretes, 1.2—2 cm. longi, virides, cataphyllis emarcidis membranaceis magis minusve in fibras solutis vestiti; cataphylla 3, oblonga, albida, brunneo-punctata, summum longe rostrato-acuminatum, fere ad 4 cm. longum. *Folium* 1 ad pseudobulbi apicem ortum; lamina lanceolata, basi longe in petiolum 1.5—2 cm. longum attenuata, apice subobtusata, 6—11 cm. longa, 1—1.5 cm. lata, coriacea, laete viridis, nervis lateralibus utrinque 2. *Racemi* graciles, laxae multiflori, 5—10 cm. longi, e pedunculo in pseudobulbo terminali pergracili ad 15 cm. longo orto penduli, floribus 2—3 mm. distantibus; bracteae scarioso-membranaceae, albidae, ovato-vel ovato-lanceolatae, 3 mm. longae, subinvolutae. *Receptaculum* angustum, cum pedicello filiformi bracteam vix aequans. *Sepala* lateralalia oblique lanceolata, acuta, patentia, 5—6 mm. longa; superum simillimum, nisi symmetricum et paululo brevius, omnia uti petala et labellum subtranslucida, pallide viridia. *Petala* patentia, elliptica, acuta, margine minutissime eroso-denticulata, 4—5 mm. longa, 2—2.5 mm. lata. *Labellum* 3-lobum, expansum 4 mm. longum; lobi laterales haud alti, lacerato-dentati, basi 1 mm. lati; intermedium late obovatum, basi cuneatim contractum et ibi callis 2 linearibus notatum. *Columna* gracilis, e medio utrinque breviter cornuto-alata, apice in alam brevem crenulatam producta. *Anthera* albida, minute apiculata. *Pollinia* 4, 0.25 mm. longa. *Walp. Ann.* VI. 927 (1861); *Orchidophile*, I. 195 (1882); *J. J. Smith, Rec. Trav. Bot. Neerl.* I. 72 (1904); *Pfitzer & Kränzlin in Engl., Pflanzenreich* IV. 50. IIb. 7. 103 (1907); *Oakes Ames, Orch. fasc.* II. 108 et III. 5 (1908). *Platyclinis uncatum*, *Vidal, Rev. Pl. Vasc. Fil.* 267 (1886); *N. E. Brown in Williams, Orch. Gr. Man. ed. VII.* 680 (1894). *Acoridium uncatum*, *Rolfe in Orch. Rev.* XII. 224 (1905).

Habitually a tufted *epiphyte*, 12-20 cm. high, with ovate-oblong transversely round pseudobulbs more or less coated with pale cataphylls which are marked with dark dots and break up ultimately into fibres. The *leaves* arise singly from the tops of pseudobulbs and consist of a lanceolate mostly obtuse or acute 5-nerved coriaceous blade long attenuated at the base and measuring 6-11

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TAB. 9016.

PIERIS TAIWANENSIS.

Formosa.

ERICACEAE. Tribe ANDROMEDEAE.

PIERIS, D. Don; *Benth. & Hook. f., Gen. Plant.* II. 588; *Lyonia*, Nutt; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 44.

Pieris taiwanensis, Hayata in *Journ. Coll. Sc. Tokyo* XXX. 169 (1911); simillima *P. formosae*, D. Don, sed foliis minoribus plerumque oblanceolatis vix acuminatis parcius crenato-serratis dorso laxe leviterque reticulatis necnon calyce breviori seminibus brevioribus et crassioribus distincta.

Frutex 1—2 (raro ad 3) m. altus, ramis rectis glabris, vetustis cinerascens, longitudinaliter sulcatis cicatricibus foliorum delapsorum et gemmulis hebetatis notatis. *Folia* superne approximata, breviter petiolata, glaberrima; lamina oblanceolata vel suboblanceolata, basi cuneatim attenuata, apice acuta vel subacuminata, supra medium crenato-serrata, margine tenuiter cartilagineo, 4—7.5 cm. longa, 1.5—2.5 cm. lata, coriacea, facie lucida et costa nervisque prominulis, dorso paulo pallidior, prominule laxe reticulata. *Paniculae* plures terminales vel ex axillis foliorum summorum ortae, multiramosae vel pauciramosae vel interdum ad racemos simplices reductae, ad 15 cm. longae; rami oblique erecti vel patentes vel cernui, subsecundi, apicem versus minute puberuli; bractae subulatae, 2 mm. longae, facie tomentellae, mox deciduae; pedicelli parce puberuli, ad 3 mm. longi. *Flores* cernui. *Calyx* viridis, alte 5-partitus, 3—3.5 mm. longus, segmentis ovatis subacutis crassiusculis intra apicem versus tomentellis. *Corolla* urceolata, 7—8 mm. longa, ad 6 mm. lata, infra apicem contracta, ore circiter 2 mm. diametro, 5-lobata, lobis latissime rotundatis 1 mm. longis 1.5 mm. latis patentibus. *Stamina* 10; filamenta deorsum dilatata, pilosula, ad basin corollae inserta, ad 3 cm. longa; antherae bifidae, e dorso medio 2-aristatae aristis ad 1.5 mm. longis, loculis subacutis poris oblongis dehiscentibus. *Discus* minutus, 10-lobulatus. *Ovarium* globosum, obscure sulcatum; stylus columnaris, 4 mm. longus. *Capsula* globosa, 5—6 mm. diametro, calyce persistente suffulta, 5-locularis, marginibus valvarum haud incrassatis. *Semina* late breviter fusiformia, utrinque obtusiuscula, pallide brunnea, 2.5 mm. longa, 0.5 mm. lata, exalata. Bean in *Gard. Chron.* LXXI. 139, fig. 68 (1922); E. H. Wilson in *Gard. Chron.* LXXIII. 63, fig. 30 (1923); *Journ. R. Hort. Soc.* XLVIII. p. xlv. (1923). *P. formosa*, Matsum. in *Tokyo Bot. Mag.* XIV. 59 (1898); Matsum. & Hayata in *Journ. Coll. Sc. Tokyo* XXII. 219 (1906); Hayata, *ibid.* XXV. 151 (1908), non D. Don.

An evergreen rather compact perfectly glabrous *shrub*, in its native habitat from 1—2, rarely 3 m., high, whose shortly stalked *leaves* are rather crowded upwards with inversely lanceolate or almost oblong blades tapering towards both ends and shallowly crenate above the middle; they measure 4—7.5 cm. by 1.2—2.5 cm. and are leathery, glossy on the face and loosely reticulate on the back. The terminal *panicles* consist of few to many erect or spreading and frequently secund racemes which

may be up to 15 cm. long and are minutely downy towards the tips like the small awl-shaped bracts and the flower stalks, which are 3 mm. long. The nodding *flowers* consist of a bright green deeply 5-cleft *calyx* up to 3 mm. long with ovate segments and of a pitcher shaped snow-white *corolla* 7–8 mm. long and up to 6 mm. wide, shortly 5-lobed and much constricted below the lobes. The 10 *stamens* are inserted at the base of the corolla; they have 2-cleft anthers with more or less spreading awns from the back and slightly hairy filaments widened downwards. The *style* is 4 mm. long and rises from a globose ovary. The *capsule* is supported by the persistent calyx; it is 5-celled and 5-valved and 5–6 mm. in diameter. The shortly spindle-shaped *seeds* are 2·5 mm. long and wingless.

DISTRIBUTION.—Formosa, mountains of the Morrison Range, 2,100–3,300 m.

There are few plants among the recent additions to horticulture which in this age of rhododendrons and primulas have been welcomed as much as this charming shrub. A native of Formosa it might not have been expected to adapt itself to our more rigorous and vagarious climate; but as far as our experience goes at present it promises to be perfectly hardy and suitable for indoor- as well as outdoor-cultivation. It was discovered by a Japanese, Dr. Honda, in Formosa in 1896, and for some time was identified with the Himalayan *Pieris formosa* (see Bot. Mag. t. 8283), a species grown with us as a green-house plant. It was subsequently repeatedly recorded from various parts of the Mount Morrison range, and with more complete material at his disposal Professor B. Hayata was in the end enabled to establish its specific distinctiveness. When in 1918 Mr. E. H. Wilson travelled in Formosa for the Arnold Arboretum he succeeded in procuring seed which in due course was distributed by Professor Sargent with his usual generosity to various European gardens. The Marquis of Headfort was one of the first to raise and bring to flower plants of that distribution. They were greatly admired when shown at one of the meetings of the R. Horticultural Society in March, 1922. The abundance of snow-white flowers

grouped either in erect or in horizontally spreading or drooping panicles and set against the rich green of the glossy foliage produces indeed a most pleasing effect. Although in its home it usually grows into a shrub 1-1.5 m. and occasionally even 3 m. high, it flowers already at a very early stage and plants grown in pots and not more than 0.5 m. high have been seen laden with flowers. Wilson collected it in open grass-clad country between 2,100 and 3,300 m. on the ranges beyond Arisan in Kagi prefecture "where it grows associated with *Rhododendron rubro-pilosum* and other shrubs and where *Pinus Armandii* forms thin woods." In the wild state, he adds, flowers are found on the plant at any season of the year. Lord Headfort writes: "I received the seed of this in April, 1919, from Sir Frederick W. Moore, who, I understand, had received it from the Arnold Arboretum under the number 'W. 10906.' I sowed the seed within a few days in an unheated greenhouse in a mixture of loam, sand and peat, having first sterilised the soil. It germinated very well and the young seedlings were picked out early in the autumn. The following spring (about May) they were transferred to a frame and planted in the ordinary soil used for *Rhododendrons*. The plant flowered for the first time in 1922 in this frame. I planted out several plants that year and they have proved perfectly hardy. As *P. taiwanensis* makes its flower-buds already in the autumn, I find it necessary to give the young buds slight protection during the winter months, as otherwise they are likely to be frosted. In every other respect the plant is perfectly hardy. It does not like lime and grows best in a sheltered border." It can be propagated from seed—it has seeded freely with Lord Headfort—or by layering or from cuttings, provided the wood is sufficiently ripened. The variation from erect racemes to such as droop after the fashion of *P. japonica* is remarkable and it appears to be quite independent of external conditions, both extremes occurring indeed in the same sowing.

The genus *Pieris* was established by D. Don in 1834 on three Himalayan species, referred until then to *Andromeda*, namely *A. formosa*, *A. ovalifolia* and *A. lanceolata*. Of these the first is most closely allied to our

plant. It is the key-species or the "type" of the genus. Don added to it later *Andromeda japonica* as *P. japonica* which much resembles *P. taiwanensis*, but differs in having smaller thinner leaves, more finely crenulate from the base, slenderer raceme-spindles and pedicels and smaller flowers. Maximowicz in 1872 referred *Pieris* back to *Andromeda*, whilst J. D. Hooker in his elaboration of the *Ericaceae* for the Genera Plantarum (1873) restricted *Andromeda* to *A. polifolia*, sub-arctic type, enlarging at the same time *Pieris* by the inclusion of *Cassandra*, another northern type, and of certain North American species, among them Nuttall's *Portuna floribunda* (see Bot. Mag. t. 1566). In 1878, however, *Pieris* was once more merged in *Andromeda* by Asa Gray (Synoptical Flora of North America), who also included in it *Lyonia*, an exclusively American and partly tropical genus, established by Nuttall in 1818 and recognised by Hooker in Genera Plantarum. Nor did the checkered history of *Pieris* end there; for Drude (Natürliche Pflanzenfamilien, 1898), re-arranging the constituents of Gray's *Andromeda* on a new basis, revived *Lyonia* with *Pieris* as a subgenus, whilst he retained in *Andromeda* only *Andromeda polifolia*, *Zenobia* and *Portuna*. D. Don's classification of the genera of the *Pieris*-group rested mainly on the structure of the stamens and their appendages, if any, and on that of the seeds; Gray's on the æstivation of the calyx; Drude's on the presence (*Lyonia*) or absence (*Andromeda*) of marginal thickenings on the capsular valves, which may become detached as "outer valves" or split longitudinally. Adopting Drude's discrimination we should have to place our plant in *Andromeda*, although he himself reckons *Pieris* among *Lyonia*. It is evident that the relationship of these groups is still debatable; in fact, Drude himself says of his *Lyonia* that it is rather a "Gattungsgruppe" (group of genera) than a "Gattung" (genus), and he divides it into five subgenera. I myself consider it most useful to retain *Pieris*, with *P. formosa* as its key-species, as a genus distinct from *Andromeda* as well as from *Lyonia*.
O.S.

Fig. 1, a flowering branch (erect form), nat. size; 2, a flower, $\times 4$; 3, stamens in front and back-view, $\times 6$; 4, pistil, $\times 6$; 5, a fruiting raceme, nat. size; 6, a seed, $\times 16$.

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TAB. 9017.

BERBERIS MORRISONENSIS.

Formosa.

BERBERIDACEAE.

BERBERIS Linn.; *Benth. & Hook. f., Gen. Plant.* I. 43 et 964; *Prantl in Engl. & Prantl, Nat. Pflanzenf.* III. 2. 77.

Berberis morrisonensis, Hayata in Journ. Coll. Sc. Tokyo XXX. 25 (1911) et Ic. Pl. Formos. I. 47, t. 10 (1911); affinis *B. diaphanae*, Max., et *B. yunnanensi*, Franch., sed ab utraque floribus minoribus, petalorum glandulis fusiformibus elongatis, fructibus subglobosis minoribus differt.

Frutex erectus, glaberrimus; rami graciles, iuniores saepe lacte rubescentes, vetusti brunnescentes vel fuscесcentes. *Folia spinесcentia* e basi ovata 2-aristulata 3-secta, spinis rectis teretibus in dorso saepe sulcatis 1—3 cm. longis subaequalibus rigide patulis. *Folia normalia* pauca vel ad 8 cum quoque brachycladio, supra basin brevissimam utrinque 1-dentatam articulata; lamina valde varia, obovata vel obovato-lanceolata, basi attenuata, apice rotundato-obtusa et spinuloso-mucronulata, integra vel magis minusve spinoso-dentata spinis tenuibus valde variis raro ultra 7 nunc antrorsum curvatis nunc rigidis magisque patulis e margine incrassato, 1·5—2·5 cm. longa, 0·5—1 cm. lata, firme papyracea, facie viridis, dorso glaucescens et levissime papillosa, laxe reticulato-venosa, autumnо pulcherrime rubescens. *Flores* 3-meri, solitarii vel plerumque 2—5-ni, e pedicellis gracilibus ad 2·5 cm. longis penduli. *Sepala* oblongo-elliptica vel obovata ad 7—8 mm. longa, 4—5 mm. lata, integra vel minute denticulata. *Petala* late elliptica, valde concava, 5—6 mm. longa, apice rotundata et 2-dentata, glandulis fusiformibus 2 mm. paulo longioribus. *Stamina* 3·8 mm. longa. *Ovarium* cum stylo brevi 3·5 mm. longum, oblongo-ovoideum; stigma discoideum applanatum, 2 mm. diametro. *Ovula* circiter 7, raro plura. *Fructus* ovoideo-globosus vel globosus, ad 1 cm. longus, apice stigmatе coronatus, ruber, ad peripheriam pellucidus. *Semina* plura, a dorso visa obovato-elliptica, triquetra, 5 mm. longa. *Berberis* sp., Hayata in Journ. Coll. Sc. Tokyo, XXV. 47 (1908).

This is a glabrous *shrub* with slender branches which often are of a brilliant red when young. Its *spine-leaves* consist of 3 almost equal rigidly spreading slender spines, 1 to 3 cm. long, whilst the deciduous *normal leaves*, which number up to 8 on each spur, are obovate to obovate-lanceolate with blunt or rounded and often mucronulate tips and entire or prickly-dentate margins, the spines being fine and curved forward or in some leaves rigidly spreading from hard thickened margins; the leaves are 1·5 to 2·5 cm. by 0·5 to 1 cm., toughly papery, green on the upper and slightly glaucous on the lower side, and they assume very brilliant colours in the autumn. The *flowers* hang from the spurs in fascicles of up to 5 on

slender stalks, 1.5 to 2.5 cm. long, and when fully open they measure over 1 cm. across. The *sepals* are oblong-elliptic to inversely ovate, the longest measuring 8 mm. by 4.5 mm., whilst the *petals* are rather broadly elliptic and slightly smaller with elongated spindle-shaped glands at the base. The *ovary* contains about 7, rarely more, ovules, and is crowned by a very short style and a flat disc-shaped stigma. The *berries* are globose or nearly globose, about 1 cm. long, brilliantly red and slightly translucent. The *seeds*, of which several come to maturity, are up to 5 mm. long.

DISTRIBUTION.—Formosa ; Mount Morrison, 3,750 m. to 3,950 m.

Few of the Old World berberries have so far been found south of the tropic of the Cancer. They are all outposts of groups which have the centre of their development in the Western and Central Himalaya (*Tinctoriae*) or in the Eastern Himalaya and the high mountains of South-west China (*Wallichianae*). Our species is a member of a more temperate type (*Angulosae*) ranging from the Himalaya and the mountains of West China, where it is confined to a zone between 3,000 and 4,000 m., to the Altai and Lake Baikal, and it is linked to the main body of the group through *B. yunnanensis*, a species of the Tali-range (3,200 m.). It was discovered in 1905 by T. Nagasawa, a Japanese teacher, below the summit of Mt. Morrison at 3,950 m., and in the following year was found again by T. Kawakami, Chief-Curator of the Museum at Taihoku, and his companion U. Mori, at a somewhat lower elevation (3,750 m.). Lord Headfort to whom we are indebted for the material from which our plate was prepared writes: "I received the seed of this in April, 1919, from Sir Frederick W. Moore, about the same time as seeds of *Pieris taiwanensis*. They, I understand, came from the Arnold Arboretum originally and were collected by Wilson in Formosa under the number 'W. 10912.' They were sown almost immediately and kept in a cool unheated greenhouse. They germinated well and the plants were planted out in a nursery bed the following year. I found them slightly tender in their young state ;

I transferred them to their permanent quarters in the Arboretum from whence the specimens were cut. Except during their two-year-old state, I have found them perfectly hardy. The plants this last year were buried in 30 cm. of snow in March this year, -9.5° C. (15° F.) being registered in the following night." They flowered in June and fruited in October. *B. morrisonensis* is equally ornamental in either state, but particularly when in the autumn the foliage turns into flaming scarlet and gold.
O.S.

Fig. 1, a flowering branch, nat. size; 2, a particularly spinous leaf from another smaller branch, nat. size; 3, a large sepal, $\times 6$; 4, a petal, $\times 6$; 5, a stamen, $\times 6$; 6, a pistil, $\times 6$; 7, the same in longitudinal section, $\times 6$; 8, a fruiting branch, nat. size; 9, a fruit in cross-section with an unusually large number of seeds, $\times 3$; 10, lower half of a fruit with the seeds removed, showing the points of attachment of the latter, $\times 3$; 11, longitudinal section of a fruit with the seeds removed, $\times 3$; 12, a seed, $\times 4$; 13, an embryo, $\times 4$.

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TAB. 9018.

PRIMULA CARDIOPHYLLA.

Sikkim.

PRIMULACEAE. Tribe PRIMULEAE.

PRIMULA Linn.; *Benth. & Hook. f., Gen. Plant.* II. 631; *Pax in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 104.

Primula cardiophylla, *Balf. f. et W. W. Smith, Notes Bot. Gard. Edin.* IX. 152 (1916); aretissime affinis *P. rotundifoliae*, Wall., sed omnibus partibus robustior, petiolis laminisque crassis his concavis, pedicellis calycibus capsulis longioribus.

Herba perennis, novellis et foliorum dorsis et inflorescentiis farinosis farina lutescente vel albida. *Folia* numerosa, basi congesta; lamina cordato-rotundata sinu haud alto, grosse crenata, primo valde concava, carnosula, 3—6 cm. diametro, facie glandulis minutis conspersa, dorso pinnatinervis; petiolus crassus, ad 10 cm. longus, primo farinosus, deinde glanduloso-puberulus. *Scapus* robustus, sub anthesi ad 20 cm. altus, maturus multo elongatus, umbellam multifloram verticillo accesorio primo approximato deinde remoto auctam gerens; bracteae lineares vel subulatae, ad 1.5 cm. longae; pedicelli sub anthesi 1—2 cm., maturi ad 3 cm. longi. *Calyx* oblongus, 5—6 mm. longus, fere ad basin divisus, segmentis linearibus vel sublancoelatis obtusis vel subacutis puberulis. *Corolla* ad 15 mm. diametro, pulchre malvaceo-purpurea, ostio aureo; tubus cylindricus in flore brevistylo ad 12—14 mm. longo, in flore longistylo basi per 5—6 mm. angustior; limbus 5- (rarius 6-) lobatus lobis late rotundatis subintegris ima basi parce farinosis. *Stamina* in flore brevistylo ad fauces tubi corollae inserta antherarum apicibus 1 mm. ab ostio remotis, in flore longistylo in medio tubo sita; antherae flavidae, 1.5 mm. longae. *Stylus* 7 vel 12 mm. longus. *Capsula* oblonga, circiter 1 cm. longa, spadiceo-fusca, valvis revolutis. *Semina* nigra, angulata, 0.5 mm. longa; testa grosse areolata. *P. rotundifolia*, Hook. f. *Fl. Brit. Ind.* III. 483 (1822) pro parte; Pax in *Engl. Pflanzenreich* IV. 237. 120, fig. 34B (1905) pro parte, non Wallich.

This is a rosulate *perennial* whose younger parts, backs of the leaves and inflorescences are covered with a white or yellowish mealy powder. The *blades* which are borne on stout stalks up to 10 cm. long are rounded-heart-shaped with a shallow sinus and coarsely crenate margins and they measure 3 to 6 cm. across; they are somewhat fleshy and more or less concave with minute glands scattered over the face. The *scapes*, up to 20 cm. high when in flower, but much elongated in the fruiting state, bear a many-flowered umbel whose flower-stalks are 1 to 2 cm. long when in flower and 3 cm. long when in fruit and are supported by linear or awl-shaped bracts up to 1.5 cm. long. The *calyx* is oblong and cleft almost to the base into linear or almost lanceolate blunt or slightly pointed puberulous segments; it measures 5—6 mm. in length. The *corolla* is mauve-purple with a golden-

yellow eye and up to 15 cm. across ; its tube is 12 to 14 mm. long, cylindrical in the thrum-eyed state but slightly constricted for 5 or 6 mm. from the base in the pin-eyed state ; the limb is 5- (rarely 6-) lobed with the lobes broadly rounded, almost entire and slightly mealy at the very base. The *stamens* of the thrum-eyed flower are inserted near the mouth of the corolla with their anthers not quite reaching it, whilst those of the pin-eyed form are placed at the middle of the tube. The *capsule* is oblong with revolute valves and measures about 1 cm. in length. The coarsely areolate black *seeds* are 0.5 mm. long.

DISTRIBUTION.—Sikkim Himalaya from 3,300 to 3,600 m.

Sir Isaac Bayley Balfour has dealt with this *primula* very fully when he described it. He grew it in the Botanical Gardens at Edinburgh from seed sent to him by Mr. Cave at Darjeeling, and the present plate was prepared from one of his plants in 1918. It belongs to a small group of Himalayan *primulas* of very similar habit and mainly differing in stature, shape of the leaves and composition of the inflorescence. Our species which has very handsome more or less fleshy leaves has frequently been collected at Sandakphu and on the Singalila Range near Darjeeling, generally at altitudes between 3,300 and 3,600 m. In Nepal and farther West through the Himalaya *Primula cardiophylla* is represented by *P. rotundifolia* which is a more delicate plant with slender leaf-stalks and scapes ; none of the members of this group has so far been figured in the Botanical Magazine, but they deserve certainly the attention of the horticulturist. All are high level plants, often growing at altitudes from 3,600 to 4,500 m. They may be expected to be hardy, but we have yet little experience as to their special needs. I may add that the longitudinal section of a flower shown in fig. 2 records the somewhat unusual occurrence of a short-styled flower with the anthers in the position characteristic of the long-styled form.

O.S.

Fig. 1, a plant, nat. size ; 2, longitudinal section of a flower (see note above), $\times 2$; 3, anther, $\times 15$.

THE ALBANY
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COROKIA BUDDLEIODES.

New Zealand.

CORNACEAE. Tribe CORNEAE.

COROKIA, A. Cunn.; *Benth. & Hook. f., Gen. Plant.* I. 949; *Harms in Engl. & Prantl, Nat Pflanzensf.* III. 8. 264.

Corokia buddleioides, A. Cunn. in *Ann. Nat. Hist.* III. 249 (1839); affinis *C. virgatae*, Turrill (vid. Bot. Mag. t. 8466), sed foliis lineari-lanceolatis vel lanceolatis, floribus bene paniculatis, ovario 2-loculari distincta.

Frutex multiramosa, gracilis, 2—4 m. altus, ramulis et foliorum dorsis et inflorescentiis tomento dense appresso subargenteo vel cineresciente tectis, pilis T-formibus, cortice vetusto atro-cinereo. *Folia* petiolata; lamina e basi attenuata lanceolata vel lineari-lanceolata, apice mucronulata, acuta vel acuminata, 5—15 cm. longa, 0·8—1·5 cm. lata, coriacea, facie primo dense pubescens vel tomentosa, mox glabrata, laete viridis, lucidula, costa venisque tenuibus leviter impressis; petiolus ad 4 mm. longus. *Panicula* terminalis, foliata, 3—9 cm. longa, ad 3 cm. lata; folia paniculae sursum cito decrescentia, valde reducta, caeterum foliis normalibus similia; rami inferiores ad 4 cm. longi, saepius multo breviores; bractae subulato-lanceolatae, ad 2 mm. longae; pedicelli graciles, ad 4 mm. longi. *Receptaculum* anguste turbinatum, 2 mm. longum, appresse pubescens. *Sepala* triangularia, 1 mm. longa, acuta, extra pubescentia. *Petala* oblonga, subobtusata, 6 mm. longa, fere 2 mm. lata, extra et ad margines pubescentia, flava vel fere crocea, intus basi squamula breviter fimbriata praedita. *Stamina* filamentis 3 mm. longis, antheris fere 2 mm. longis. *Ovarii* 2-locularis vertex valde convexus, in stylum 2·5 mm. longum contractus; stigma 2-lobum. *Drupa* globosa, atro-rubra, 8 mm. diametro, carne parca; putamen crassum, cavernosum, 2-spermum. *Semina* anguste oblonga, 3 mm. longa, 0·7 mm. diametro. *Embryo* cotyledonibus clavato-linearibus. Hook., Ic. Plant. t. 424 (1842); Raoul, Choix d. Pl. Nouv. Zélande, 46 (1846); Hook. f., Fl. New Zeal. I. 98 (1853) et Handb. New Zeal. Fl. 106 (1864); E. Regel, Gartenfl. XX. 66 t. 679 figs. 2—6 (1871); Kirk, Stud. Fl. New Zeal. 224 (1898); Cheeseman, Fl. N. Zeal. 237 (1906).

A graceful slender *shrub* 2 to 4 m. high with a dense close silvery or greyish hair-covering on the younger branches, the backs of the leaves and the inflorescences which is made up of T-shaped two-celled hairs; the leaves pass from a slender stalk, up to 4 mm. long, into a linear-lanceolate or lanceolate pointed thinly leathery blade, 5 to 15 cm. by 0·8 to 1·5 cm., bright green and shining on the face which thus contrasts vividly with the silvery back. The *flowers* are grouped in leafy terminal panicles, 3 to 9 mm. long, supported by small lanceolate to awl-shaped bracts, and borne on slender pedicels up to 4 mm. long. The slender top-shaped *receptacle*, the small triangular *sepals* and the oblong more or less

obtuse *petals* are downy on the outside; the latter measure 6 by 2 mm. and are bright yellow to saffron-coloured and they carry a small fimbriate scale at the base. The *anthers* are 2 mm., their filaments 3 mm. long. The crown of the 2-celled *ovary* is very convex and passes rather abruptly into the style with its 2-lobed stigma. The *fruit* is a globose blackish-red drupe, 8 mm. in diameter and very scantily fleshy; the shell of the stone is very thick and cavernous and holds generally 2 narrowly oblong seeds.

DISTRIBUTION.—North Island from the North Cape to the East Cape, from sea-level to 900 m.

This shrub is one of the four species constituting the genus *Corokia*, a peculiar member of the Cornaceae which is confined to New Zealand and to Chatham Island. By the structure of the flower and fruit it comes near to *Cornus*, a genus of the Northern Hemisphere, and it differs technically from it mainly in the presence of small more or less dissected scales at the base of the petals and by the structure of the hairs which are T-shaped as in *Cornus*, but consist of two cells instead of only one. *C. buddleioides* grows mainly in or on the borders of the forests and ascends from sea-level to 900 m., and it is locally common. On the exposed tops of the mountains it becomes much stunted. It was discovered by Allan Cunningham on the shore of the Bay of Islands in 1826, but does not seem to have been introduced into cultivation until many years later. E. Regel in 1871 credits its introduction to Ferdinand von Müller, the indefatigable Australian botanist. Kew received the seed from which the plant depicted here was raised from Dr. L. Cockayne. Here it is treated as a green-house plant, as which it is easy to grow if given a loose loamy turfy soil, but in the milder parts of the country it may be expected also to succeed out of doors.

O.S.

Fig. 1, a flowering branch, nat. size; 2, a flower, $\times 4$; 3, a petal with its basal scale and the two adjoining stamens, $\times 8$; 4, a flower with the petals and stamens removed, $\times 6$; 5, longitudinal section through an ovary, $\times 8$; 6, a fruit, $\times 2$; 7, the same in longitudinal section, showing two chambered cavities, $\times 2$; 8, a seed, $\times 6$; 9, the same in longitudinal section, $\times 6$. (Figs. 6 to 9 were prepared from a specimen collected on Capt. Wilkes's Expedition.)

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TAB. 9020.

PICEA GLEHNII.

Japan.

CONIFERAE. Tribe ABIETINAE

PICEA Linn.; *Benth. & Hook. f., Gen. Plant.* III. 439; *Eichl. in Engl. & Prantl, Nat. Pflanzenf.* II. i. 77.

Picea Glehnii, *Masters in Gard. Chron.* XIII. 300, fig. 54 (1880); affinis *P. nigrae*, Link, et *P. rubrae*, Link, sed corticis delaminatione, ramulis plerumque in sulcis solis pubescentibus, gemmis resinosis, foliis saturate viridibus, stomatium dispositione, strobilorum ♀ colore, conis maioribus satis distincta.

Arbor in patria ad 30—40 m. alta trunco 1—1.5 m. diametro, comam angustam formans, cortice rufescente vel fusciscentis laminis irregularibus tenuibus cinerascentibus soluto; rami patentes, apice sursum curvati, pro rata breves; ramuli iuniores in sulcis dense breviterque pubescentes, flavido-rufescentes vel rufi. *Gemmae* inter folia summa sessiles, ovoideo-ellipsoideae, resinosae, brunnescentes vel castaneae, nitidae, ad 8 mm. longae, squamis rufo-fimbriatis superioribus apiculatis vel mucronatis. *Folia* brevissime petiolata, dense prorsus directa, aggregata, acicularia, linearia, acuta vel subacuta, recta vel curvata, sectione transversa rhombica, 6—14 mm. longa, fere 2 mm. lata, costa marginibusque prominulis obtusis, facie ac dorso saturate viridia et stomatifera, stomatibus in facie utrinque 2-seriatis, in dorso 1-seriatis. *Strobili* ♂ brunnei vel flavescentes, cylindrici vel oblongi, demum ad 15 mm. longi, ad 6 mm. lati, pedunculo ad 5 mm. longo. *Stamina* 2 mm. longa; connectivi appendix suborbicularis, denticulatus. *Strobili* ♀ laterales, oblongi, ad 2 cm. longi, 1 cm. lati; carpella late ovata, denticulata, obtusa, violacea, 2 mm. longa; squamae ovuliferae rotundatae, supra medium minute eroso-denticulatae, 6 mm. longae, 7 mm. latae, atro-violaceae, leviter pruinosaе, purpureo-marginatae. *Coni* maturi oblongo-ovoidei (aperti) vel oblongi (clausi), 4—8 cm. longi, ad 2—3 cm. lati, penduli; squamae ex ungue late obtriangulari late rotundatae, integrae vel erosulae, ad 1.2 cm. latae, fusco-brunneae, nitidulae, demum angulo recto-patentes, obovoideae. *Semina* 2 mm. longa, testa fusca, ala obovata ad 7.5 mm. longa 4.5 mm. lata apice late rotundata et obscure denticulata. *Masters in Journ. Linn. Soc.* XVIII. 512, fig. 13 (1881); Mayr, *Abiet. Japan.* Reich. 56, 102, t. 4, fig. 11 (1890) et *Fremdländ. Wald-u. Parkbäume* 327 (1906); Kent, *Veitch's Man. Conif.* 437 (1900); Beissner, *Handb. Nadelholzk.* 377 (1891) et ed. II. 255 (1909); Shirasawa, *Icon. Ess. Forest. Japon* II. t. 3, figs. 19—42 (1908); Clinton-Baker, *Ill. Conif.* II. 39 (1909); Elwes & Henry, *Trees of Great Britain and Ireland* VI. 1369 (1912); Wilson, *Conif. and Tax. of Japan*, 40, tt. 25, 26 (1916); *Gard. Chron.* LXVII. 89, fig. 36 (1920); Dall. & Jacks., *Handb. Conif.* 330 (1923). *Abies Glehnii*, Schmidt, *Reise i. Amurl.* in *Mém. Imp. Ac. Sc. St. Petersb.* sér. 7, XII. 176, t. 4 (1886).

This is in its home a tall *tree* up to 40 m. high with a trunk 1 to 1.5 m. in diameter and covered with a reddish or chocolate-brown bark which fissures into irregular thin plates; the main branches spread horizontally with up-curved tips and are relatively short, forming a slender crown; the younger branchlets are more or less reddish with a dense down in the grooves only. The *buds* are

sessile among the crowded uppermost leaves, egg-shaped, brown, resinous and glossy and up to 8 mm. long with fimbriate and (the upper) pointed scales. The shortly-stalked deep green *leaves* are crowded, directed more or less forward, needle-shaped, pointed, straight or curved, rhombic in cross-section and 6 to 14 mm. long and almost 2 mm. wide; the stomata are arranged in two pairs of rows on the upper-side and in one pair of rows on the under-side. The *male catkins* are yellow to brown and finally up to 15 mm. long. The *female cones* when in flower are up to 2 cm. long and 1 cm. wide and dark or bluish-violet with red edges to the scales; when mature they are pendulous, oblong (closed) or oblong ovoid (open), 4 to 8 cm. long and 2 to 3 cm. across, brown, and slightly glossy with their scales finally spreading horizontally; the exposed edges of the scales are broadly rounded and entire or minutely eroded. The *seeds* are 2 mm. long, black-brown with inversely ovate obtuse wings (7·5 mm. by 4·5 mm.) whose outer margins are slightly denticulate.

DISTRIBUTION.—Yezo and southern Saghalien.

This spruce is a common tree in parts of Yezo, so in the west of the island where with *P. ajanensis* it forms mixed forests on the cooler slopes of the mountains, whilst in the eastern parts of Yezo, as in Kitami and Kushiro provinces, it occurs in pure stands, often of considerable extent, in swampy river valleys. Here, however, the trees are not quite so tall as in the west, where on an average they attain to nearly 36 m. Elwes observed it near Lake Shikotsu at 450 m., but it was much less abundant than *P. ajanensis*. It is still rarer at Sapporo, where it is confined to the higher mountains. From Yezo it extends northwards to the plains and valleys of southern Saghalien, but it has not been recorded from the Kurile Islands. In Saghalien it never grows into really big trees. It was here that Peter Glehn, F. Schmidt's assistant on his expedition to Eastern Asia, discovered it in 1861, whilst in 1877 it became known from Yezo through Veitch's collector Charles Maries, who was the first to send seeds home. Beissner in 1891 speaks of small plants of *P. Glehnii* being grown in Germany, but it is evidently as rare there as it is in this

country. The Marquis of Headfort possesses some good specimens of Glehn's spruce in his fine collection of trees and shrubs at Kells, Co. Meath, Ireland. One of them is about 5 m. high and of very regular conical growth. It is from this tree, which is about 16 years old, that the specimens depicted here were taken. Lord Headfort, so he informs us, bought this plant from Messrs. Veitch & Sons in Coombe Wood nursery in October, 1912. It was planted in the Pinetum in February, 1913, being about 1 m. high. It grew slowly at first and was twice slightly cut by spring frosts, in 1915 and 1917, but never hurt to any extent. It has grown well since and is now about 5 m. high and cones regularly every year. It is planted in a fairly sheltered position in moist ground and Lord Headfort considers it absolutely hardy. *P. Glehnii* has also coned in the late Sir Edmund Loder's garden at Leonardslee—see Gard. Chron., LXVII. 89, fig. 36 (1920). O.S.

Fig. 1, a branchlet with male catkins, nat. size; 2, and 3, dehiscent anthers in side- and front-view, $\times 8$; 3, bis (below), a branchlet with young female cones, nat. size; 4 and 5, a leaf in back- and face-view, $\times 4$; 6, a small mature cone, nat. size; 7, a cone-scale in face-view, $\times 2$; 8 and 9, seeds, $\times 2$.

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TAB. 9021.

VIOLA ELEGANTULA.

Europe.

VIOLACEAE. Tribe VIOLEAE.

VIOLA Linn. ; *Benih. & Hook. f., Gen. Plant.* I. 117 ; *Taubert in Engl. & Prantl, Nat. Pflanzenf.* III. 6. 334.

Viola elegantula, Schott in *Oest. Bot. Wochenschr.* VII. 167 (1857) ; arcte affinis *V. declinatae*, Waldst. & Kit., sed foliis plerumque latioribus, stipulis minus alte divis, petalorum colore distincta.

Herba perennis, e rhizomate tenui multicaulis, caulibus ascendentibus 10—30 cm. longis glabris vel subglabris. *Folia* inferiora approximata, caetera magis minusve dissita, longiuscule petiolata, eximie stipulata, omnibus partibus tenuissime puberula saltem ad margines, rarius glabra ; lamina inferiorum rotundata, e basi interdum subcordata, caeterorum magis minusve ovata vel obovata vel summorum lanceolata, basi attenuata, obtusa vel summorum subacuta, paucicrenata crenis haud altis latis, 8—12 mm. longa, 4—10 mm. lata, amoene viridis ; petioli foliorum inferiorum ad 1.5 cm. longi, superiorum sensim decrescentes ; stipulae ambitu oblique late ovatae, foliorum superiorum ultra 1—1.5 cm. longae, multifidae, inferiorum magis minusve redactae, segmento intermedio ovato vel lanceolato-oblongo petiolulato, caeteris 8—9 oblanceolatis vel quae basin spectant linearibus acutis inferne confluentibus, disco ita formato petiolulo ad medium adnato. *Flores* pedunculis ad 5 cm. longis suffulti, varie colorati. *Sepala* late lanceolata, acuta, 7—10 mm. longa, 2—3 mm. lata, appendicibus late oblongis maioribus apice erosis vel 2-lobis vel irregulariter dentatis ad 4 mm. longis. *Petala* superiora obovata, saturate vel rubro-violacea, 10—18 mm. longa, 9—12 mm. lata, intermedia similia sed paulo minora, infimum late obovatum vel subobcordatum, unguiculatum, ad 10 mm. longum, ad 15 mm. latum, colore superiorum praeter basin auream lineis 6—7 atro-purpureis notatam et unguem pallidum, calcare subrecto 6—8 mm. longo (color floris teste collectorum variat ad roseum vel flavum vel albidum). *Antherae* ellipticae, 1.5 mm. longae, connectivi appendice aurantiaco et ut thecarum margines villosulo-ciliolato. *Stigma* suboblique capitatum, ad latera albo-pilosulum. *Capsula* ad 7 mm. longa. Becker in *Beih. Bot. Centralbl.* XVIII. 2. 384 (1905) et *Viol. Europ.* 88 (1910) ; Vandas, *Reliq. Forman.* 52 (1909) ; Hayek in *Denkschr. Ak. Wiss. Wien, Math. Nat. Kl.* XCIV. 29—31 (1917). *V. gracilis*, Vis., *Fl. Dalm.* III. 150 (1850), non Sibth. & Sm. *V. speciosa*, Pant. in *Oest. Bot. Zeit.* XXIII. 79 (1873). *V. bosniaca*, Forman, in *Oest. Bot. Zeit.* XXXVII. 368 (1887) ; G. Beck in *Ann. Nat. Mus. Wien.* X. 179 (1895). *V. declinata*, G. Beck, *Fl. Südbosn. & Herzeg.* 82 (1887) ; Freyn & Brand., *Fl. Südbosn. & Herzeg.* 23 (1888) ; Murb., *Beitr. Fl. Südbosn. & Herzeg.* 164 (1891), non Waldst. & Kit. *V. declinata* var. *bosniaca*, Forman, in *Oest. Bot. Zeit.* XXXVIII. 422 (1888). *V. latisejala*, Wittr., *Viol. Stud. in Act. Hort. Berg.* II. 99 t. vii. figs. 82—88 (1897), non Wettst.

A perennial herb, 10 to 30 cm. high, with numerous more or less glabrous stems ascending from a slender rhizome. The leaves have large stipules grown to the long stalks up to their middle and they are very finely puberulous or almost quite glabrous ; their blades are

rounded in the lower leaves, but otherwise ovate to lanceolate from a narrowed base, blunt at the tips, sparingly crenate and bright green, and they measure 8 to 12 by 4 to 10 mm.; the stipules are obliquely and broadly ovate in general outline, up to 1.5 cm. long and much divided from a disc-shaped base, the 8 to 10 segments varying from ovate (the intermediate which is moreover shortly stalked) to inversely lanceolate or linear. The *flowers* are borne on stalks up to 5 cm. long and measure about 2.5 cm. across. The *sepals* are lanceolate, acute, 7 to 10 mm. long and 2 to 3 mm. wide and they carry at their base broad blunt or notched appendages up to 4 mm. long. The *petals* are broadly and inversely ovate and measure 10 to 18 mm. by 9 to 12 mm. (the upper and lateral) or 10 by 15 mm. (the lowest); their colour is generally a rich reddish-violet except at the base of the lowermost which is golden-yellow with 6 to 7 black-purple streaks, but the flowers are said to vary in their home to rose, yellow and white. The *anther-cells* are villously ciliate and the oblique capitate *stigma* is finely and minutely hairy on the sides. The *capsule* is about 7 mm. long.

DISTRIBUTION.—Mountains of Bosnia and the Hercegovina and southward to Central Albania, from 700 to 2,000 m.

This *viola*, although relatively new in gardens, has a long and varied history as can be seen from the references to literature at the end of the Latin description. A native of the north-west corner of the Balkan Peninsula it has at different times been connected with species of the neighbouring countries and at other times it has been described and redescribed as a new species. This is not surprising if we consider the number and nature of the characters which combine in varying ways in the forms that constitute the "*lutea*"-series to which our plant belongs. Our knowledge of them was chaotic until Becker and Hayek taught us to discriminate between them; but even so there is still much to be learned concerning the genetic behaviour of the characters and the phyletic relations of the forms distinguished, so that the controversy about the status and the name of our *viola*.

can hardly be considered as closed. Work on the lines of J. Clausen's researches on the *Viola-tricolor*-series (see Bot. Tidsskrift. XXXVII. 205-221; 1921) would advance much our knowledge of the group whilst it would at the same time contribute to the solution of the horticultural problems connected with it. There is no doubt that *V. elegantula* and its immediate allies contain the elements for further improvements and variations in the already rich and beautiful stock of garden forms derived from the "*lutea*"-series.

The present plate was prepared from specimens supplied by Sir John Ross of Rostrevor, Co. Down, Ireland, who has been growing our viola for the last nine years. It behaves in every respect like the ordinary violas of our gardens and is a particularly free and prolonged flowerer. Neither the specimens which I saw at Rostrevor nor those grown at Kew have so far given any colour-variations which is rather remarkable as according to the collectors the populations of *V. elegantula*, as observable in the field, are particularly varied as far as colour is concerned, the flowers running through purple, rose and yellow to white.

The discovery of *V. elegantula* dates back to the forties of the last century. Visiani was the first to record it (as *V. gracilis*, Sibth. & Smith) in 1850 with Mts. Gniath and Prolog in the Dinaric Alps on the frontier of Dalmatia and Bosnia as habitat, and it was from a specimen from Prolog that Schott described our species seven years later. In 1872 Dr. J. Pantocsek found it in Montenegro (Mt. Dormitor). Unaware of its identity with Visiani's plant he gave it a new name, *V. speciosa*, in allusion to the size and beauty of its flowers. Since the occupation of Bosnia and the Hercegovina by Austria, which gave a great impetus to the systematic exploration of these countries, it has been collected again and again in the sub-alpine and alpine zones of the mountains from the neighbourhood of Travnik southwards, whilst Baldacci discovered it later in Albania. It was no doubt from Bosnia that *V. elegantula* found its way into our gardens where it became known as *V. bosniaca*. Becker records a natural hybrid of *V. elegantula* $\times$ *tricolor* from Harambasaci near Travnik where Father Erich Brandis, a keen

student of the Bosnian flora, found it growing among the parents in a field high up in the mountains. The same combination has been described recently as *V. × knap-tonensis* (Journ. R. Hort. Soc. XLII. p. cxxvi (1917).
O.S.

Fig. 1, part of a plant, nat. size; 2, a leaf with its stipules, $\times 2$; 3, a flower in back view, nat. size; 4, pistil with some of the stamens and anthers attached to it, $\times 4$; 5, an anther, $\times 7$.

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PHILADELPHUS DELAVAYI.

China.

SAXIFRAGACEAE. Tribe PHILADELPHAEAE.

PHILADELPHUS Linn.; *Benth. & Hook. f., Gen. Plant.* I. 642; *Engler in Engl. & Prantl, Nat. Pflanzenf.* III. 2a, 69; *Koehne in Gartenfl.* t. 456 (1896).

Philadelphus Delavayi, L. Henry in *Rev. Hort.* 1903, 12, fig 3, non Hutchinson in *Bot. Mag.* t. 8324; a *P. purpurascens*, Rehder, quocum confusus erat habitu robustiore magis erecto ramis ab initio plerumque omnino glabris foliis maioribus iuventute in dorso subtomentosis, floribus multo maioribus differt.

Frutex ad 3 m. altus, ramis purpurascens vel serius subcastaneis ab initio glaberrimis. *Gemmae* canae, breviter conicae, acutiusculae, hieme ultra foliorum cicatrices exsertae. *Folia* petiolata; laminae ovatae, ovato-oblongae vel ovato-lanceolatae, breviter (vel in ramis adventitiis longe) acuminatae utrinque 7—14 dentatae dentibus saepe obscuris nisi hyalota maiuscula notatis, magnitudine valde variae, 6—12 cm. longae, 2—4.5 cm. latae vel in ramis sterilibus ultra 15 cm. longae et ad 7 cm. latae, tenuiores, facie virides et minute sparse pilosae, dorso subglaucae, primo albido-pubescentes, deinde praeter nervos glabrescentes, 5-nervi; petioli 5—7 mm. longi. *Racemi* terminales, interdum floribus ex axillis foliorum summorum aucti, 5—7-flori, glaberrimi. *Pedicelli* 1—1.5 cm. longi. *Receptaculum* turbinatum, 5 mm. longum, fere atropurpureum, glaberrimum. *Sepala* ovata, acuta vel acuminata, 5—6 mm. longa, purpurascens, intra albo-sericea, extra glaberrima. *Petala* late rotundato-elliptica, fere 2 cm. longa, 1.5 cm. lata, obtusissima, nivea. *Stamina* circiter 35, filamentis 6—7 mm. longis. *Stylus* e disco lato ad 8 mm. longus, vix ad medium 4-partitus, glaber; stigmata ad styli ramos decurrentia angusta, 1.5—1.75 mm. longa. *Ovarium* 4-loculare. *Koehne in Mitt. Deutsch. Dendr. Gesellsch.* 1904, 82 et 1906, 51; *C. Schneider, Handb. Laubholz.* I. 370 (1905); II. 930 (1912); *Rehder in Mitt. Deutsch. Dendr. Gesellsch.* 1915, 220; *Rehder & Wilson in Sarg., Pl. Wils.* III. 421 (1917).

This is a *shrub* 2 to 3 m. high with upright glabrous and sometimes pruinous, purplish or chestnut-brown branches and with greyish conical leaf-buds which in the winter are exserted from the leaf-scars. The *leaves* are borne on stalks 5 to 7 mm. long and they vary much in size and shape, being either ovate, ovate-oblong or ovate-lanceolate and shortly acuminate with 7 to 14 small teeth on each side and 5 nerves from near the base, their dimensions being 6 to 12 cm. by 2 to 4.5 cm. or, in the barren long-shoots, up to 15 cm. by 7 cm.; they are rather thin, green and sparingly hairy on the face and somewhat glaucous, and whitish-downy or at last almost glabrous on the back except on the nerves. The loose *racemes* are 5 to 10 cm. long and they carry 5 to 7 large, mostly

snow-white fragrant flowers, 3 to 4 cm. across, on pedicels 1 to 1.5 cm. long. The top-shaped *receptacle* and the ovate acute *sepals* which are very finely silky on the inside are frequently bronzy- to blackish-purple. The *petals* are almost round and they measure 15 to 17 mm. in diameter. The glabrous *style* is entire up to beyond the middle, then 4-cleft and hardly exserted from the stamens; the stigmas are narrowly oblong.

DISTRIBUTION.—North-west Yunnan, from the Likiang range to the Tibetan frontier from 2,700 to 3,000 m.

This most handsome species was discovered by Père Delavay in Yunnan at an altitude of 3,000 m. in 1887. Forrest found it subsequently on the eastern flank of the Lichiang range (No. 2195) growing among scrub in open situations and also near Tsekou on the Tibetan frontier (No. 555). It was first (1900) brought to flower in the garden of the Muséum d'Histoire Naturelle at Paris from seed received from Delavay in 1888. The present plate was prepared from material kindly placed at our disposal by Mr. G. D. E. Loder who grew the plant from Forrest's seed in his garden at Wakehurst, Ardingly, Sussex. *P. Delavayi* is perfectly hardy here as well as on the continent; in fact, M. L. Henry considers it even hardier than *P. Coronarius*. It is a rather early flowerer (the middle of June in Sussex) which character in addition to the size of its fragrant flowers, whose whiteness is emphasized by the bronzy-purple of the calyx, renders it a most desirable acquisition for the garden, all the more so as it requires no more attention than our common mock-orange.

The affinity of *P. Delavayi* would seem to lie with the American *P. californicus* in Koehne's section *Gemmatae* if the grouping attempted by that author can be accepted throughout as representing natural phyla. O.S.

Fig. 1, a flowering branch, nat. size; 2, a portion of a flower-stalk, $\times 5$; 3, a portion of a full-grown leaf, seen from the back, $\times 3$; 4, a flower with the petals removed, $\times 2$.

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TAB. 9023.

OURATEA FLAVA.

West Africa.

OCHNACEAE. Tribe OURATEEAE.

OURATEA Aubl.; *Engl. in Engl. & Prantl, Nat. Pflanzenf.* III. 6. 140; *Gomphia*, Schreb.; *Benth. & Hook. f., Gen. Plant.* I. 318.

Ouratea flava, *Hutchinson & Dalziel* MS. (nov. comb.); ab *O. reticulata*, Beauv., quacum olim confusa foliis arcte spinuloso-serratis, inflorescentia robustiore differt.

Frutex, interdum arborescens, 1—5 m. altus, glaber; rami teretes, iuniores virides, vetusti cortice cinerascens tecti. *Folia* breviter petiolata; lamina oblonga, basi acute cuneata vel rarius subobtusata, apice acuta vel breviter acute acuminata, interdum undulata, praeter basin integram arcte spinuloso-serrata, dentibus ad 5 per 1 cm., 10—25 cm. longa, 4—7.5 cm. lata, coriacea, laete viridis, nitidula, exsiccando saepe leviter glaucescens, costa dorso prominente, nervis primariis utrinque 10—15 valde prorsus curvatis et prope marginem ipsum iunctis, uti nervi secundarii et venulae creberrimae utrinque eleganter prominulis; petiolus incrassatus, 3—5 mm. longus; stipulae caducissimae, lanceolato-subulatae, scariosae, nervoso-striatae, 2—2.5 mm. longae. *Inflorescentiae* terminales, laxae paniculatae, saepe pauciramosae, ad 25 cm. longae; rami subflexuosi, patentes, 6—12 cm. longi, purpurascens vel rubri; bractae ovatae, 1 mm. longae, caducissimae; pedicelli 3—5-ni, fasciculati fasciculis 5—8 mm. distantibus, 7—14 mm. longi, supra basin articulati, parte basali persistente. *Sepala* oblonga, obtusiuscula, concava, 5—7 mm. longa, sub anthesi patentia et flava, maturitate reflexa et sanguinea. *Petala* obovato-cuneata, leviter emarginata, 9 mm. longa, aurea, patentia, decidua. *Stamina* 5, in conum arcte conniventia, sessilia; antherae e basi incrassata subulatae, acutae, transverse rugulosae, 4.5 mm. longae, aureae, sub apice poris apertae. *Ovarium* profunde 5-lobum; stylus filiformis, 4—5 mm. longus. *Drupulae* perfectae plerumque 3—1, ambitu oblongo-ellipticae, atro-purpureae, nitidae, ad 8 mm. longae, 5 mm. diametro. *Embryo* hippocrepiformis, cotyledone una valde redacta angusta faciei alterius crassissimae incumbente vel obsoleta. *O. spinuloso-serrata*, Gilg in *Engl. Bot. Jahrb.* XXXIII. 265 (1903); A. Cheval., *Expl. Bot. Afr. Occ. Franc.* I. 109 (1920). *Gomphia flava*, Schum. & Thonn., *Beskr. Guin. Pl.* 216 (1827); Hook. f. in *Hook. Fl. Niger* 272 (1849); Stapf in *H. H. Johnston, Liberia*, II. 586 (1906). *G. macrocarpa*, Hook. f. ex Planch. in *London Journ. Bot.* VI. 2 (1847); *G. reticulata*, Oliver, *Flor. Trop. Afr.* I. 320 pro parte (1868), non Beauv.

This in its home is a *shrub* or small *tree* from 1 to 5 m. high with bright green branches glabrous like all other parts. The thin but tough leathery bright-green *leaf-blades* are borne on short stout stalks flanked at an early stage by awl-shaped stipules 2—2.5 mm. long, which fall off very soon, leaving a comparatively large scar; the blades are more or less oblong, acute or acuminate and exquisitely serrate, the teeth being almost pungent and very close, and they measure 10 to 25 cm.

by 4 to 7.5 cm. ; the nerves (10 to 15 pairs) are strongly curved forwards towards the margin and like the finer partly transverse veins slightly prominent on both sides. The *flowers* are arranged in loose terminal panicles with long spreading branches on which they are grouped in bunches of 3 to 5, their stalks which are 7 to 14 mm. long being jointed above the base. The persistent oblong, concave and obtuse *sepals* are 5 to 7 mm. long ; they are yellow in the flower and spread at right angles, but they turn blood-red in the fruit—becoming deflexed at the same time. The deciduous *petals* are inversely ovate with a wedge-shaped base, bright yellow and about 9 mm. long. The 5 almost sessile awl-shaped *anthers* connive in a slender cone around the style, dehiscing with two pores near the apex. The deeply 5-lobed *ovary* matures only three or two or only one of its lobes, which grow into separate purplish-black dry *drupelets* seated on an enlarged blood-red “torus,” each holding a single seed with an *embryo* that consists of a minute radicle and a large horse-shoe-shaped cotyledon to whose back is sometimes appressed a narrow slender rudimentary second cotyledon.

DISTRIBUTION.—Sierra Leone to Angola, extending inland beyond the great forest-belt.

This brilliantly coloured shrub is one of a number of closely related species of West Africa which are often difficult to discriminate, the differential characters being mainly in the shape and the dentation of the leaves and, to a lesser degree, in the size of the flowers, the length of their stalks and the shape of the drupelets. It has a wide range from Sierra Leone to Central Angola, extending inland in places beyond the forest-belt and inhabiting open savannah forest or occasionally, as part of the undergrowth, rain-forest. It was discovered over a hundred years ago by Thonning in the then Danish colony of the Gold Coast, but it has long been confused with the very similar *O. reticulata*, the *Gomphia reticulata* of Palisot de Beauvais who had collected it in the delta of the Niger about 1787. This appears to be a more graceful plant with less and differently toothed leaves. *O. flava* is like all its congeners a typically tropical plant

and has therefore to be treated as a stove-plant ; but as such it does not require any special treatment and can easily be propagated from cuttings in a warm case with a temperature of 15° to 20° (60° to 70° F.) although they strike slowly. The plant has been in cultivation in the Royal Botanic Garden at Edinburgh since 1914 when it was raised from seed received from Mrs. Emma B. Gough and originally obtained by her from the Botanical Garden at Aburi. Both the flowering and the fruiting specimens shown in our plate were drawn from the Edinburgh plant, the former in 1920, the latter last year.

Two species have so far been figured in the Botanical Magazine, *O. decorans* (t. 5262) and *O. Theophrasta* (t. 5642), both natives of South America. The genus is very large—over 250 species are on record—and distributed generally over the tropics of both hemispheres. It is remarkably uniform in appearance and structure, and it is difficult to distinguish natural phyla in it unless the generalisation that the Old World species possess horse-shoe-shaped embryos, whilst the embryos of the species of the New World have equal straight cotyledons should prove true. This might point to an early branching of the primitive stock from which the genus has evolved ; but so far few species have been examined in that direction. *O. flava* is a good example of the first type with the further peculiarity that one cotyledon is frequently obsolete whilst in other cases it grows out into a filiform or, at the base, slightly widened organ which lies in a median groove on the face of the other very large recurved cotyledon, the plumule and the radicle being in either case very small. Van Tieghem, it is true, has divided the genus into thirty-four genera, but Gilg has shown conclusively that the segregation proposed by the great French anatomist rests on such precarious ground as to be quite untenable.

The substitution of the name *Ouratea* for *Gomphia* may require a few words of explanation for those who are more familiar with the older nomenclature. *Ouratea*—the name was derived from “ourati” the French version of the Carib name of *O. guianensis*—was fully described and well illustrated by Aublet in his great work on the flora of French Guiana in 1775. For some unexplained

reason it fell into oblivion and became superseded by Schreber's name *Gomphia* (1789), which was meant to replace a still earlier name *Jabotapita* proposed by Adanson (1763) for a West-Indian species of *Ouratea*, presumably because it appeared to the author too barbarous. More recently German and French botanists have gone back to Aublet's name as they were perfectly justified to do, and the number of combinations under *Ouratea* soon outnumbered those under *Gomphia* so far that the conservation of the latter name would entail a perfectly unreasonable duplication of names. O.S.

Fig. 1, a flowering branch, nat. size; 2, a flower without the petals, $\times 4$; 3, anthers in side and front-view, $\times 7$; 4, top of an anther, showing the pores, $\times 20$; 5, part of a fruiting panicle, nat. size; 6, section through a ripe drupelet, $\times 3$ (the reduced cotyledon is visible on the right lying in a groove in the bigger basal half of the large cotyledon); 7, a seed in side view, $\times 3$; 8, the same seen from the side where the reduced cotyledon lies in the groove shown in fig. 6, $\times 3$; 9, radicle and plumule with the base of a solitary cotyledon, the other being completely suppressed $\times 20$.

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